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15 June 1981

China Report

AGRICULTURE

No. 145

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ABSTRACTS

I. GENERAL INFORMATION

OVERCOMING WEAK LINKS TO DEVELOP GRAIN PRODUCTION URGED

Beijing RENMIN RIBAO in Chinese 5 Mar 81 p 3

[Article by Xin Naiquan [0207 6621 6112] of the Chinese Academy of Agricultural Sciences: "We Must Stress Key Points and Weak Links To Develop Grain Production"]

[Text] Our country's grain production has a great many weak links and a great potential for increased production. In order to raise grain production, we must pay attention to key points, grasp the weak links, and raise production in major grain crops like rice, wheat, corn and soybeans.

In rice production, late rice is the weak link. The areas planted in late rice and early rice throughout the country are about the same, but as compared to early rice, the per unit yield of late rice is low and unstable, with total output being 20-30 billion jin less in total output. One reason why late rice yields are not high is that it grows in the season of high temperatures and high humidity when damage from disease and insects is most serious. A second reason is that it is insufficiently fertilized, getting less fertilizer in general than early rice. The third reason is limitation of the growing season, with reduced production resulting if the autumn low temperatires (called the Cold Dew Wind in some areas) comes a few days early. If we carry out conscientious analysis and research on these problems, employ strong measures, select and use strains that mature early, are disease resistant, and have high yields, develop green manure, use more chemical fertilizers, and effectively prevent and control weeds, insects, and disease, we will gradually be able to increase late rice production. In recent years, late rice per unit yields in Guangdong and Guangxi has approached that of early rice. In the principal rice areas of the Yangtze River valley, such as You County in Hunan, the suburbs of Shanghai, and Suzhou in Jiangsu, there are many examples of late rice overtaking early rice. This shows that it is not impossible for late rice to overtake early rice if we only catch up with the management measures for late rice.

The key point for increasing production of wheat is to pay attention to the low production areas. According to statistics for 91 prefectures in the country's 10 principal summer grain provinces, there are 49 prefectures with per unit yields lower than the national average, accounting for 42 percent of the total area

of the 10 principal summer grain provinces. Of these 49 prefectures the average per unit yield in 13 prefectures is less than 150 jin. Therefore, raising yields in these low production prefectures as rapidly as possible is an important link in raising our country's summer grain production. In some prefectures with low production levels of summer grains, the principal reasons, from the standpoint of production conditions, are drought, waterlogging, sandiness, alkalinity , and exhausted soil. In the three provinces of Hebei, Shandong and Henan, the area of such low-yielding fields amounts to half or more of the cultivated area, and in some the yield per mu does not exceed 100 jin. However, practice has shown that it is not difficult to transform these low yielding fields. In Wenxi County on the loess plateau, after adoption of dry land cultivation and management measures like deep plowing, increase application of organic fertilizer, and spring employment of autumn rains, a bumper wheat harvest was obtained. For the past few years, a great many areas and units like northwest Shandung Province and Quzhou County in Hebei Province, by employing scientific cultivation and comprehensive administration of low yielding fields, have transformed low yields of summer grain to high yields. They have doubled and redoubled production, with per mu yields of some wheat fields reaching 600 jin or more, bringing the grain yield per mu for the whole year to more than 1,000 jin.

In corn production we must pay attention to summer corn. The area sown to corn throughout the country is subordinate only to that in rice and wheat, and is our third major grain crop. However, the per unit yield for corn is very low, only 339 jin in 1979, 58 jin below the world average per unit yield (the per unit yield for corn in the United States is 792 jin). In corn production, our country's summer corn accounts for 60 percent of the area sown to corn for the whole year, but its per unit yield averages only a little more than 200 jin. Because summer corn is, for the most part, interplanted and multi-cropped, many areas do not take it seriously enough, fertilize insufficiently and are careless in management. In addition, the late season temperatures are not warm enough in some years or low temperatures and early frosts are encountered, all of which makes yields low and unstable. However, there are many examples in various areas where summer corn yields approach or surpass those of spring corn. For example, the suburbs of Beijing, Shijiazhuang Prefecture in Hebei Province, and Yantai Prefecture in Shandong Province all have units where the yields in field production of summer corn exceeds 1,000 jin. This shows that there is an extremely great potential for increasing the yields of summer corn. If we make one great effort and raise the per unit yields for summer corn throughout the country to the present level of the average per unit yield for corn nationwide, total output could increase by more than 20 billion jin.

Vigorously grasp soybeans. Our country is the original source of soybeans, the history of its cultivation is very long. In the past we have accounted for 90 percent or more of world exports, but since the late 1950's, the area we have sown to soybeans has shrunken repeatedly and soybean production has tended to fall. The area planted in 1979 was only a little more than 100 million mu and total output was only 14 billion jin, a reduction of more

than 30 percent compared to 1956 and a reduction of 42 percent from the historically high year of 1938. According to statistics, most of the reduction in soybean-planted area has been in the Huanghuai [Yellow River-Huai River] area, such as northern Jiangsu and northern Anhui, and secondarily, in the three provinces in the northeast. Since soybeans are an oil crop as well as a grain crop and a non-staple food, and are also an export commodity, soybean production abroad has developed rapidly in recent years. The United States originally imported soybeans from our country, but by 1977 the planted area had expanded to 360 million mu with total output reaching 93.4 billion jin, about 7.5 times that of our country. Brazil's soybean production has also surpassed ours. If we want to improve rapidly the backwardness of our soybean production, we must restore soybeans to the crop rotation, gradually expand the planted area, establish a base area for commercial soybeans, and at the same time pay attention to the selection and promotion of new varieties while increasing the application of phosphate fertilizers in soybean areas.

If the various areas, while carrying out a readjustment of the internal structure of agriculture, can pay attention to grasping well the foregoing weak links in grain production, fully extend existing agricultural technology, and enable management and technical work to catch up, our country's grain production will certainly take on a new look.

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CSO: 4007/348

RICE EXPERT CHEN WEIQIN INTERVIEWED

Guangzhou NANFANG RIBAO in Chinese 19 Mar 81 p 3

[Article by Huang E [7806 1494] and Zhang Tao [1728 3447] "New News and Old News About Wild Rice Research. Interview With Famed Paddy Rice Expert Chen Weiqin [7115 3555 2953]"]

[Text] We have heard that in recent years research on wild rice plant resources has aroused serious attention both at home and abroad. For this reason, we interviewed the famed rice expert Chen Weiqin, director of the Rice Institute of the Provincial Academy of Agriculture, who is now in process of collecting and studying wild rice.

The 68-year-old Chen Qeiqin has a lean body, but his complexion is ruddy, his health hale and hearty, and his movements lively. He says this is the result of having lived in rural villages all his life and of having then in contact with the soil for a long time. Talking away, he suggested we go see the wild rice nursery and the fields to increase our understanding a little. In the not very large nursery was row upon row of flower pots planted with the wild rice varieties commonly found in China, wart grain wild rice and wild rice used for medicinal purposes. Some seemed to have grown tall and spindly; some had coarse stems shaped like bamboo shoots; and some had worts protruding from their leaves, but most had a profusion of panicles and leaves and sparse grains. In the open fields, they had hybridized eight wild rices and short varieties last year. Some of these hybrids were not growing straight up, but were trailing along on the ground. Only close inspection made it possible to distinguish the rice from the grass.

"Never mind that they don't look very nice. For thousands of years they have grown in valleys, in the wilds, in depressions, at the edges of sinkholes, enduring wind, rain, cold and heat to develop resistance and adaptability to all sorts of bad environments and natural disasters. They are the ideal parent pairs for the breeding of resistance. Still, it will take several generations of observation to figure out their generic laws completely." Having said this, Chen Weiqin reflected respectfully on his old teacher, the famed rice expert Ding Yin [0002 4481].

Once research on wild rice was not news at all. In 1926, Ding Ying discovered common wild rice at Xiniuwei in Guangzhou. He used the genes of low fertility requirements sturdy growth, and resistance in this wild rice to lead to the planting

of "Zhunaan," and the breeding of "Zhongshan No 1," which was followed by constant selection to produce "Baotaiai," and "Baoxuan No 2.". These two species, which were bred in 1932, became dominant superior varieties for many years, and now after almost 50 years, they are still commonly grown in many places in Guangdong, Guangxi, and Fujian. Output from these two varieties isn't very high, but their resistance and adaptability are very strong. They grow in any weather and in any soil, so even though some people would like to get rid of them, they cannot be gotten rid of. As a result of the article he wrote in 1933 titled, "New Variety Bred From Guangdong Wild Rice," Ding Ying became famous throughout the world. Chen Weiqin told us that it is rare for a variety to be continuously used for 50 years. Ding Ying's contribution was very great. Research on wild rice is a cause! At that time, Ding Ying conducted research under very adverse conditions, and unhappily after Ding Ying's death, for various reasons, no one continued this cause. During the 10 years of disturbances, in particular, the more than 200 wild rice varieties that he had so painstakingly collected were dumped into a ditch, and the large quantity of data he had collated was burned. Was it only the painstaking efforts of a scientists that were thus burned? No, this was a precious treasure of the country!

(2)

Our people underwent 10 years of calamities, but even during the months and years of unspeakable difficulties, in the heart of Chen Weiqin, as in the hearts of most scientists, the burning cause was not extinguished. After waiting until the warmth of spring, the flowers of their heart's desires bloomed again. He decided to carry out development of his teacher's cause. In the course of his numerous exchanges with us, he went from the events of the past to his hopes for the future, without once speaking of the misery he had endured during the 10 years of catastrophe. Mostly he spoke of wild rice research and rice planting endeavors. Thus we came to understand how intensely interested he was in the study of wild rice.

Chen Weiqin is a student of paddy rice cultivation. In 1933 he graduated with honors from the agricultural department of Zhongshan University. His teacher was Ding Ying. It was not until after liberation, however, that he really had the conditions to study cultivation. He spent 4 or 5 years working with an investigation team and researchers concerned, investigating and summarizing experiences with increased output on the Chaozhou-Shantou Plain and the Pearl River Delta. He travelled all over the Jianjiang Plain, the mountain regions of northern Guangdong, and the Dong Jiang river basin. At several representative spots, he remained to study for a year or more, walking the fields and observing all day long. His assistants said that all the kinds of soil, the farming systems, and climatic conditions of the province are stored in his brains. The technical reform measures he proposed for the promotion of "Chaozhou and Shantou farming experiences, for close planting in small plots, and for superior varieties" played a great role in increasing agricultural output at the time. Later, under the guidance of Ding Ying and in cooperation with personnel concerned in the Academy of Agriculture and the South China Agricultural Academy, he conducted research in the control of the number of panicles and the number of grains, growth of tillers and growth of young panicles about which he wrote a treatise titled, "Tiller Development in Paddy Rice and Young Panicle Development in Paddy Rice," which won a National Science Congress award in 1978. Together with comrades in the High Output Rice Farming Research

Unit, he conducted research on color changes in high yield rice in the Chaozhou-Shantou area, again theorizing high output experiences in Chaozhou and Shantou in an article he wrote titled, "Fertilization and Watering Techniques Using Changes in Leaf Color (dark reddish green) As a Criterion), for which he received a Guangdong Science Congress award in 1979. These principles continue to guide rice farming in Guangdong Province right up until the present time.

As time passed, one question turned round in Chen Weiqin's brain: why was it that for many years grain output in Guangdong had hovered at about 33 or 34 billion jin per year, and output was not consistent? He said that during the early 1960's Guangdong's and Jiangsu's output had been about the same, and as far as superior varieties were concerned, Guangdong had no lack. So why was it that Jiangsu's output had increased over Guangdong's by more than 1 billion jin? Technically speaking, the problem lay in Guangdong's emphasis on superior varieties while slighting farming techniques. The emphasis on superior varieties was correct, but to make "varieties the one and only" would not do; attention would have to be given both to superior varieties and to superior methods. Jiangsu had emphasized both superior varieties and changes in the conditions of production. Still another problem was that superior varieties had fine high output properties, but their resistance was poor, the reason being the rather poor resistance of the short stem sources used in hybridization. When they encountered the five frequent scourges of Guangdong, "water, drought, wing, insect pests, and disease," output became inconsistent. He said that on the basis of several decades experience, he felt that both breeding of varieties and farming techniques had become concentrated on solution to the resistance problem. It seemed that use of wild rices as parent pairs was one way to solve the problem of breeding strongly resistant short stem stock hybrids. In 1979 when Huiyang Prefecture had a flood, Chen Weiqin made an inspection trip, observing that all the rice around the Bolo County Agricultural Institute had been drowned, and only the wild rice along roads and ditches not only had not died. but had blossomed and set fruit.

(3)

In early 1979 following his appointment to directorship of the rice institute, Chen Weiqin's first act was to launch collection of wild rices, and even before the formal establishment of the research problems unit, he borrowed 700 yuan and went off to Bolo with several assistants.

"The cause that Ding Ying had embarked upon was embarded upon once again; wild rice would be collected anew and studied anew." Chen Weiqin believed he would be able to start anew and hoped that "now it would be different from Ding Ying's lone struggle at a previous time, and that he would receive approval from various echelons of leadership for planned arousal of the masses to participate." Where he went he proselytized, and wherever he could hold classes he held them, or lectured wherever he could.

Some of the common people called wild rice "ghost grain," or "pheasant grain," or "crazy rice" to denote the difficulty in finding it. But Chen Weiqin had a way of doing things. Whenever he went to a place, he would seek out the people who collected firewood, went hunting, or sought medicinal herbs, letting them take the

lead. As a result of their many years experience in combing the wilds, these people had numerous opportunities to spot wild rice, and after receiving a few pointers, they were able to locate it just as expected. Although he was getting on toward 70 years of age, Chen Weiqin took his walking stick in hand and continued to climb mountains and cross ranges with the technicians and the masses. Once he set out, it would be one day, or possibly several consecutive days, of walking. People knew he had heart trouble and urged him not to walk, but rather to remain at home and provide guidance. But he said, what kind of agricultural research is it if one simply moves his mouth without moving his legs. He was thinking that so long as he could continue to move, he would make a general survey of wild rices throughout the province. On Hainan Island, he and the others traversed more than 10 mountains large and small including Jianfengling, Limushan, and Qizhifent. In Ya County, when he climbed the Longling at an elevation of between 400 and 500 meters above sea level, he clutched his walking stick and raising a foot and putting down a foot, he would walk and rest, walk and rest. By the time he reached the foot of the mountain after 9 o'clock at night, his face and ears were red, and he was panting

After several months of observations, which brought great results, Chen Weiqin became even more anxious. Guangdong was a primary place of origin for wild rices. More than 10 years earlier at Bolo, he had seen several sorts even as much as 100 mu tracts of wild rices, which as a result of the clearing of land for farming of recent years, the construction of roads, and the capital construction of farmlands had now largely disappeared. Unless collection were urgently undertaken, it would become extinct. For more than 2 years, Chen Weiqin and his assistants aroused the masses to make a general survey of six special areas, collecting a total of more than 2,100 different ecotypes of three species of wild rice. At the International Rice Conference convened in Guangzhou last year, Chen Weiqin made a "Report of Survey of Bolo County Wild Rices."

"Belatedly, in recent years various countries of the world have shown a trend in their breeding work to emphasize wild rice resources, and people from far away have come here to look for such resources." Chen Weiqin told us a story. In 1974, during a visit to Jilin Province by the American botanist, Bonade [0130 4780 1795] [phonetic] he preferred to walk rather than ride. On one occassion he suddenly came upon a wild soybean plant in the mountains, which was as though he had found a treasure. He even took off his camera, and careful packed away this bean plant, which he took back to the United States. Subsequently, following hybridization, he bred a superior soybean variety capable of resisting nematodiasis, which in the course of several years was able to solve the problem of nematodiasis in soybeans in 14 of the states of the United States. This scientist had made an achievement. After this incident became known, the scientific and technical world in Jilin Province was shaken, and impetus was given to research with wild soybean resources in China. The Philippines also bred the superior rice variety, IR 36, which is able to resist numerous diseases and insect pests. Some countries have now luanched the hybrid breeding of wild sugarcane, wild bananas, and wild sweet potatoes.

Last year Chen Weiqin led a cooperative effort by the resources unit and the plant protection institute to identify wild rice varieties resistant to the principal diseases and insect pests such as bacterial blight, blast of rice, rice leafhoppers,

and rice gall flies. Preliminary discovery has been made of materials possessing first rate resistance to bacterial blight, and of materials possessing general resistance. They are now preparing research on the resistance genes to determine whether there are multiple genes or a single gene, and whether they are dominant or recessive, so as to be able through hybridization to eliminate undesirable characteristics from wild rice.

"The task is an arduous one, and the process of hybridization requires a long time, doesn't it?" we asked.

"Yes! I am an old man now and I don't have the energy I used to have, but this is a cause I want to continue and make some achievements. I also hope that the leadership units concerned will organize the cooperation of those involved in breeding, in cultivation, and in plant protection work, so the work may be done more rapidly." When we were looking at Chen Weiqin's confidant smile, we firmly believed that the cause of Ding Ying and the older generation of scientists is bound to be fulfilled! Wild rice research will certainly blossom and bear fruit!

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BRIEFS

FARM MACHINERY SALES EXHIBITION--Beijing, 25 May (XINHUA)--A sales exhibition of Chinese-made farm machinery, the biggest ever in China, opened here t day in the National Agricultural Exhibition Hall. It is sponsored by the Ministry of Farm Machinery and includes products from 200 major factories, covering cultivation, animal husbandry, drainage and irrigation, and crop-protection and processing. China's best-selling export models are also on show. He Jinde, director of the exhibition office, said the purpose of the show is to introduce China's best farm machinery to domestic and foreign buyers. The major factories have greatly improved the quality of their products over the last 2 years. Last year, they exported machinery worth 24 million U.S. dollars, 46.3 percent more than in 1979, and the export trade is even brisker this year. The exhibition, closes on 31 October. [Beijing XINHUA in English 1248 GMT 25 May 81]

RAPESEED HARVEST--Beijing, 27 May (XINHUA)--China has reaped a record tonnage of winter rapeseed, harvesting 2.86 million tons on 3.36 million hectares, according to the Ministry of Agriculture. The harvest follows the harvests of 1978, which produced 1.85 million tons, 60 percent more than the previous year. 1981 winter output was 32 percent more than 1980 and 29.6 percent more than 1979, the previous record year. Winter rapeseed is produced in 13 provinces and Shanghai Municipality. Henan and Shaanxi Provinces had been forecast to increase yields more than 10 percent and Sichuan, Jiangsu, Jiangxi and Yunnan Provinces and Shanghai more than 20 percent. Anhui, Hunan, Hubei, Guizhou and Fujian Provinces produced 30 percent to 70 percent more than last year. Zhejiang, devastated by a hailstorm this spring, showed less than 10 percent growth while Shandong's harvest grew 250 percent. China has expanded winter rapeseed fields by 1.3 million hectares over four years, growing it not only south of the Yangtze River as before but along the Yellow River. [Text] [OW271223 Beijing XINHUA in English 1214 GMT 27 May 81]

YUNNAN, FUJIAN AGRICULTURE--Beijing, 28 May (XINHUA)--Yunnan Province produced 187,000 tons of cane sugar this year, a 9.3 percent increase over 1980. Peasants in Fujian Province had sold 6,100 tons of spring tea to the state by May 10, a 27.6 percent increase over the same 1980 period. The province now has 100,000 hectares of tea plantations. Yongding County in Fujian Province, a high-quality tobacco producing area, estimates a harvest of 6,000 tons of tobacco this year on 5,400 hectares of tobacco fields. This would be double the 1980 output. [Text] [OW281038 Beijing XINHUA in English 0732 GMT 28 May 81]

CSO: 4020/196

INCREASES IN SUGARCANE PLANTINGS, HARVEST IN GUANGDONG REPORTED

New Sugarcane Plantings

Guangzhou NANFANG RIBAO in Chinese 21 Mar 81 p 1

[Text] This year, Guangdong Province has made strenuous efforts to plant more sugarcane even while maintaining increased output of grain, and it has simultaneously striven to increase per unit yields. As of 19 March, 2.26 million mu of sugarcane was newly planted throughout the province, a 300,000 mu increase over the same period last year. Quality is also universally better than in previous years.

In order to arouse the enthusiasm of the masses for sugarcane farming and further develop sugarcane production in Guangdong Province, the Provincial People's Government readjusted its sugarcane policies at the end of last year, putting into effect new methods, which greatly pleased the masses. These included "checking and ratifying basic figures, linking sugar and grain, exceeding basic figures, a ton of sugar is the equivalent of a ton of grain, full awards and full penalties, and guaranteed no change for 5 years." Additionally, the method used last year whereby prefectures were the units for settlement of accounts was changed to production teams being the units for the settlement of accounts. Last winter and this spring, while organizing this year's production of sugarcane, all jurisdictions used the party's policies in propaganizing the masses to arouse their enthusiasm. While guaranteeing increase output of grain this year, Foshan and Panyu prefectures have again enlarged their sugarcane farming areas. In order to strengthen leadership of sugarcane production, each of the counties in the Hainan Administrative District have appointed a deputy secretary of the County CCP Committee, or a deputy county head, responsible for this task. Wenchang County has disbursed 600,000 yuan of public funds to assist development of commune and brigade sugarcane production.

While expanding the area of sugarcane cultivation, each jurisdiction has given attention to adoption of various measures in an effort to increase yields per unit of area. In some of the suuurbs and counties of Guangzhou mun'cipality, 95 percent of the production teams have set up one form or another of a system of responsibility for production, with the result that farming preparations for sugarcane production were done meticulously this year and sufficient fertilizer was put down, generally between 30 and 50 dan per mu. In new plantings of sugarcane, every locale used the method of propagating seedlings and transplanting them. By so doing, a saving in sugarcane stock could be realized and seedlings could be better protected to

grow sturdily, and the growth period for the cane lengthened, thereby realizing higher output. The Hainan Administrative District's various counties continued to operate high output sugarcane sites on an area of more than 4000 mu.

Foshan Prefecture Sugar Harvest

Guangzhou NANFANG RIBAO in Chinese 21 Mar 81 p 1

[Text] Foshan Prefecture reaped a bumper 1980-1981 sugarcane harvest, with the average output of sugarcane and sugar both exceeding all-time highs. As of 10 March this year, 2.44 million tons of sugarcane, or 86 percent of total output, had gone into the refineries, and 30[illegible],000 tons of sugar had been produced for a 17.2 percent overfulfillment of sugar output plans for this crushing season, and a 26.3 percent increase over the same period in the last crushing season.

Foshan Prefecture is one of the major sugar production bases in Guangdong Province. Last year, the Provincial People's Government instituted preferential policies for sugarcane including price subsidies, return to farmers of a portion of sugar refinery profits, and a ton of grain for a ton of sugar for a portion of output in excess of plan. These policies effectively aroused the enthusiasm of the broad masses of cadres and people in sugarcane growing areas. Everywhere throughout the prefecture emphasis was given to leadership, areas for the growing of sugarcane were put into effect, systems of responsibility were implemented, and scientific methods for growing sugarcane were put into practice. These, plus the rather plentiful fertilizer and fine weather conditions, produced a great increase in sugarcane output. From last year's 610,000 mu of sugarcane, the prefecture harvested average yields (industrial output) of 4.62 tons per mu, a 1.12 ton increase over the previous year. Doumen County, located along the seacoast, grew sugarcane in sandy and salty fields along the sea, increasing sugarcane acreage from the former 58,000 mu to 71,200 mu. Total output rose from 168,000 tons in 1979 to 250,000 tons, a 49.7 percent increase. As a result of the institution last year of "three guarantees and one reward" in most of the production teams of the sugarcane growing region, in a system of responsibility requiring specific production from households or teams, total output of sugarcane in the county reached 700,000 tons, a 50 percent increase over the previous year.

Shunde County Plantings

Guangzhou NANFANG RIBAO in Chinese 14 Mar 81 p 1

[Article by Er Kuan [1422 1401], Quan Qiu [2938 4428] and Wen Jian [2429 0313]

[Text] Xunde County has taken advantage of the season to plant new sugarcane in accordance with high standards, to care for perennial root stock, to strive to increase per unit yields of sugarcane, and to increase total output to make a great contribution to the country. The county has already planted more than 50,000 mu of winter and spring sugarcane, which amounts to 60 percent of the planned new plantings. On the more than 30,000 mu of perennial sugarcane rootstock, clearing of fields, loosening of the soil, and prevention and eradication of insect pests has been completed. Quality of all of the farmwork has improved over last year.

Xunde County is one of the two major sugar producing counties in Guangdong Province. Last year, this county's total sugarcane output was 16 percent higher than during the previous year, with yields averaging 5.2 tons per mu, a 1.28 ton increase over the previous year. In order to make a greater contribution to the country in this new year, the county has taken note that even though the county's per unit sugarcane yields have attained rather high levels a rather great disparity exists from one commune to another and from one brigade to another. The county, therefore, decided to make an all-out effort to increase outputs per units of area, In late January, they convened a countywide sugarcane production conference to summarize and spread the experiences in scientific sugarcane growing of Shajiao Commune, at which it was decided to stress three key measures throughout the county this year. First is institution of the rotational cropping of sugarcane and grain, sugarcane and mulberry, and sugarcane and peanuts in order to increase soil fertility and get high yields both from the sugarcane and from these crops. This year the area in the county for crop rotation of sugarcane with grain, mulberry and peanuts totals 30,000 mu or more than 20 percent of the sugarcane area. Second is use of scientific planting techniques such as disinfection of cane stock, planting of sprouted stock, and transplanting seedlings for the overwhelming majority of newly planted cane so as to lengthen the growing period for the sugarcane, and increase the length and girth of the cane stalks. Third is the adaptation of general methods to specific times and places for the growing of various kinds of superior cane varieties. In addition to further strengthening of leadership in sugarcane production from the county to communes and production brigades so that the aforementioned measures for increased output will be implemented, the county and communes have alloted some funds to assist and to reward communes and brigades with outstanding accomplishments in the scientific growing of sugarcane.

9432
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READJUSTMENT OF CROP STRUCTURE STUDIED

Guangzhou GUANGDONG NONGYE KEXUE [GUANGDONG AGRICULTURAL SCIENCES] in Chinese No 2, 8 Mar 81 pp 1-5

[Article by Yuan Zhiqing [5913 1807 3237], Zhu Hongmo [2612 7703 3352], and Yin Lixin [3009 4539 2450]: "Exploration of Readjustment of Guangdong Province's Crop Structure"]

[Text] Since the Third Plenary Session of the 11th Party Central Committee, Guangdong has reaped rather good economic results from the steps it has taken in the readjustment of the crop structure. The crux of readjustment lies in reduction of the grain crop area and expansion of the economic crop area. This is the road to which Guangdong Province's agriculture must hew, emphasizing the pluses, avoiding the minuses, and making the most of advantages.

Our province is an area suited to development of diversified economic crops. Development of economic crops is rather adaptable to the natural laws and economic laws of Guangdong Province, and rather able to make the most of the region's natural and economic advantages to obtain quite good economic results. However, for many years Guangdong Province has overemphasized the production of grain crops and has not made the most of advantages for growing economic crops in a single grain crop economic structure. This has been an extremely important reason why agricultural production has developed slowly. Consequently, study of ways to coordinate development of grain crops and economic crops, the fixing of relatively reasonable proportions, efforts to make fullest use of Guangdong Province's agricultural resources, natural, economic, and technical conditions, and the investment of a relatively small workforce and capital to gain substantial economic benefits is a strategic decision for the rapid development of agriculture and for enlivening the economy.

1. Analysis of the Historical and Present State of the Crop Structure in Guangdong Province.

During the past 30 years in which Guangdong Province has adopted a course combining expansion of the area sown and increase in per unit yields, achievements have been made in farming output. A comparison of total output of crops of various kinds in 1979 with the period immediately following Liberation shows a 1.39-fold increase in grain, a 10.3-fold increase in sugarcane, a 4.6-fold increase in edible oils, and a 26.2-fold increase in hemp, flax, etc. Output value from the farming sector has increased 147 percent.

Despite ups and downs during the past 30 years in the crop structure of Guangdong Province, overall there has been gradual development in a rational direction. In 1949, the ratio of grain crops to economic crops (including other crops, and the same applies in the following) was 9:1. By 1952, it was 8.8:1.2; by 1957, 8.5:1.5; and by 1965, 8:2. Subsequently, during the 10 years of catastrophe, the proportional figures cannot be statisticalized. In 1979 with the adoption by the Central Committee of a series of policies to promote agricultural production, and following some slight readjustments in the crop structure of Guangdong Province, the proportion of grain crops to economic crops was 7.8:2.2.

The history of the crop structure in Guangdong Province shows that during the periods when the proportion between grain crops and economic crops was coordinated, the two reinforced each other, and growth in output became relatively rapid. The 1963-1965 period was one of rather good growth in the farming industry of Guangdong Province. The rural economic policies of this period were quite capable of arousing enthusiasm for production, and scientific farming was also done quite well. On this basis, the proportion between grain crops and economic crops was readjusted to 8.2. In a comparison of 1965 with the period of the First Five-Year Plan, the area sown to grain crops diminished by 13.64 million mu, and the area sown to economic crops increased by 4.49 million mu. Sixteen percent of wetlands were used to grow economic crops. Green manure and pulses accounted for more than 17 million mu. An average of half of all wetlands grew one crop annually for the nurture of the soil, land use and land nurture were rather well combined. Commitment of the workforce and of funds also received fairly good all around attention. As a result, this was the period of all-time maximum economic benefits for farming in Guangdong Province. Despite cuts in the grain crop acreage, the annual average increase in total grain output reached 9.9 percent, (with paddy rice accounting for 10.5 percent of this total). Rate of increase for economic crops was even greater, with sugarcane averaging an increase of 53.7 percent, and peanuts averaging a 19.3 percent increase. See Table 1 for details.

Table 1. Annual Average Speed of Increase in Total Output of Major Crops During Different Periods. Units: %

Year	Ratio of Grain to Economic Crops	Grain	Rice	Sugarcane	Peanuts
Period of First Five-Year Plan 1953-1957	8.5:1.5	5	3.8	10.6	5.4
1963-1965	8:2	9.9	10.5	53.7	19.3
1953-1978	9.:1-7.7:2.3	2.5	2.5	4.6	3.9

Output value from farming increased 20 percent between 1965 and 1975, and average per capita distributions increased 47.4 percent. Costs were low with expenditures for production amounting to only 26 percent of total earnings. During the 10-year period of catastrophe, however, farming output in Guangdong Province fell into chaos, and the crop structure was very unstable. Statistics for areas sown to various crops are in a mess and difficult to analyze. But two points are fairly certain:

one is that grain crops squeezed out economic crops. In the case of 1979, for example, economic crops grown on wetlands then covered 3,225,500 mu less than in 1965. Second was a more than 5 million mu decrease, as compared with 1965, in crops for the nurture of the soils such as pulses and green manure. The annual average rate of increase in output of major crops during this period was as follows: grain only 1.9 percent (with rice accounting for 3.3 percent of this total), sugarcane 4.2 percent, and peanuts 2.1 percent. Average annual per capita income increased by only 0.68 percent, and consumption grain increased annually by an average of only 0.5 jin. The average annual increase in farm earnings was only 1.2 percent while production expenses increased 63 percent. From this may be seen that whether or not the crop structure is sensible is a major factor influencing the speed of growth of agriculture.

During the past 30 years, generally speaking, the steps have been small and the speed slow in the growth of agricultural production in Guangdong Province. Between the time of cooperativization and communalization, production relationships in agriculture underwent several transformations, yet the structure of agricultural production saw few changes. As of now, self-sufficiency in grain is still paramount, and it is in the category of small-scale agriculture with very low commodity rates. The entire agricultural economy remains in a state of no development. This is very much the result of the many years' emphasis on an economy self-sufficient in grain. In 1979, the crop structure of Guangdong was as shown in Table 2.

Table 2. Guangdong Province Farm Crop Structure in 1979

Grain Crops as a Percentage of Total Area Sown	Including			Economic Crops and Other Crops as a Percentage of Total Area Sown	Including		
	Rice	Wheat	Tubers		Sugarcane	Peanuts	Soybeans
78.18	60.79	7.4	12.5	21.82	2.6	5.5	1.9

Note: Table does not include mulberry, fruit orchard, or tea areas

Numerous problems exist in this crop structure, one of which is the still excessive proportion of grain crops, which make it difficult for Guangdong Province to make the most of the exceptional advantages it possesses for growing tropical and semi-tropical economic crops. Another is the continuous cropping of grain for long periods of time, which causes decline in soil fertility and low per unit yields of grain. Still another problem is the limitations on development of economic crops, which makes it difficult to meet the needs of the national economy. Guangdong Province's dominance in the growing of sugarcane ranks first in the country, yet in 1979 the sugarcane area amounted to only 5.6 percent of the total area under cultivation in the province, and 2.6 percent of the total area sown. Mulberry was planted on only 0.33 percent of the cultivated land in the province, a vast difference from the 1.87 million mu of 1922, which was an all-time high. The growing of economic crops on wetlands was still less by 950,000 mu than in 1965. A fourth problem is the low proportion of crops for the nurture of the soil. They amount to only 11 percent of the area sown, 30 percent less than in 1965. Exhaustion of soil

fertility is great, and accumulation of fertility slight. Most of the cultivated land in the province has a less than 2 percent organic content, a 0.7-0.8 percent decline from the 1960's. Effectiveness of fertilization has dropped. In the 1960's, 1 jin of ammonium sulfate would bring a 16 jin increase in paddy output, but today it will bring only a 12 jin increase. Fifth is high costs and little benefit. In 1979, production costs averaged 44.58 yuan per mu (24 yuan more than in 1965), amounting to 42.5 percent (in 1965, it was only 23.4 percent) of the output value per mu, while benefits received were 5.3 yuan per mu of cultivated land less than in 1965.

2. Ideas for Readjustment of Guangdong Province's Crop Structure

An ideal crop structure should be able to most fully, most economically, and most effectively utilize agricultural resources, maintain a fine farmland ecological system and, to the maximum extent possible, increase the soil productivity rate, the labor productivity rate, and economic benefits. But determining the crop structure is still subject to certain social and historical conditions; consideration must be given the requirements of the state planned economy and the needs of the peoples' livelihood. The principles that Guangdong Province should follow at the present stage in the readjustment of its crop patterns are: First, those that help break the vicious cycle; second, those that help make the most of strengths; three, those that fundamentally solve the grain problem; and four, those that help adapt farming to local conditions, suitably centralize production, and develop commodity production.

By learning from the lessons of historical experience, focusing on existing problems, and in accordance with the aforementioned principles, Guangdong Province's crop structure should be readjusted in the following four ways.

(1) Chnage of the single grain economy structure, with promotion of grain production simultaneous with across-the-board development of farming, forestry, livestock raising, sideline occupations, and fisheries, as well as of economic crops. This is a good course capable both of sustaining increased grain output and increasing economic benefits.

During the 14-year period between 1965 and 1979, the area sown to grain crops in Guangdong Province increased by 4,597,000 mu (for a 5 percent rate of increase), but the speed of increase in total grain output became slower and slower. During the 3-year period of readjustment, the average annual growth rate for grain was 5.9 percent. During the period of the Third Five-Year Plan, it dropped to 2.7 percent; during the period of the Fourth Five-Year Plan, it was only 1.6 percent (the national average was 3.2 percent); and during the first 3 years of the Fifth Five-Year Plan (1976-1978), it again fell to 0.2 percent and into a state of stagnation. Meanwhile, the speed of increase in economic crop output was also rather slow. History has shown that the greater the emphasis on grain, the more difficulty in increasing grain output. Moreover, for many years, some counties, communes, and brigades have advanced grain output even while developing across-the-board agriculture, forestry, livestock raising, sideline and fishery industries as well as economic crops. As a result, tremendous growth has occurred in the output of economic crops, and per unit yields of grain have mounted rapidly for increases in total output and striking increases in economic benefits. In 1979, Dongguan,

Bole, Panyu, Xunde, Chenghai, Yingde, Yunan, and Tan, eight counties of different character, reduced their grain crop acreage and increased their economic crop acreage from 2.2 to 6.4 percent, gaining fine results thereby. A comparison with 1978 showed a 4-16 percent increase in per unit grain yields, with total output of most of the counties increasing by a rate of 5-9 percent. Growth increases for economic crops was also substantial with total peanut output increasing by from 20-197 percent. Earnings for the entire farming industry increased by from 5 to 36 percent, and per capita distributions increased by from 4-28 percent.

For many years, from the plains, hills and mountain areas of Guangdong Province have come representative examples of across-the-board increases in output and earnings resulting from a change to economic crops with promotion of both grain and economic crops. Take, for example, the situation in the Tucheng Production Brigade of Lianshang Commune, in Chenghai County on the Chaozhou-Shantou Plain, where the population is large relative to available land and where per unit yields of grain are rather high. In 1979, the grain acreage was reduced by 17 percent from what it had been in 1976, and the acreage changed to the growing of peanuts, and citrus fruits. As a result per unit grain yields increased 39 percent and total output increased 18.7 percent. Economic crops showed great increase in output. Earnings from the farming industry as a whole increased 35.5 percent, or an average 11.5 percent annually. At the Qicun Brigade of Tanzhou Commune in the sandy soil commodity grain region of the Pearl River Delta where per unit grain yields are moderate, rice and sugarcane dominate the crop structure. In 1971, the sugarcane acreage was 21 percent of the cultivated land and the paddy rice acreage amounted to 76 percent of the cultivated land. A double bumper harvest in grain and sugarcane was won that year. As compared with 1965, the paddy rice output increased from 640 jin to 928 jin per mu for a total increase in output of 15 percent. Per unit yields of sugarcane rose from 3.5 tons to 4.76 tons per mu for a total increase in output of 138 percent. Earnings from farming increased 67.8 percent, and per capita distributions of income increased 69 percent.

This structure has been fundamentally maintained for many years, and it is estimated that per unit yields of paddy rice during 1980 will reach 1160 jin per mu, and per unit yields of sugarcane are forecast at more than 5 tons per mu. At the Yanshi Production Brigade, Hanguang Commune, Yingde County in the hilly region of the Bei Jiang, the ratio of grain crop and economic crop acreage was changed from the 79:21 of 1977 to 68:32, as a result of which per unit grain yields increased 40 percent; total output increased 15 percent; and farming industry earnings increased 86.8 percent.

This shows that when solution to the grain problem is sought in the across-the-board development of agriculture, forestry, livestock raising, sideline industries, and fisheries as well as in economic crops, the entire agricultural economy is enlivened, and only then does grain output have a foundation for sustained rises, and only then are things done in accordance with natural laws and economic laws. This is because: First, a rational structure and rotation of grain and economic crops can produce a fairly good farmland ecological system, and both grain and economic crop per unit yields are able to increase. When rice is planted after sugarcane, fertility of the soil increases and rice output goes up by 10 or 20 percent. When sugarcane is planted after rice, diseases and insect pests are fewer, and output of sugarcane increases by more than 10 percent. If 1 mu of

land yields 250 jin of peanuts, 12 jin of nitrogen will be fixed in the soil, and the peanut plants and peanut shells will return 54 jin of nitrogen to the soil for a total gain of 66 jin of pure nitrogen, a quantity of nitrogen sufficient for 3 mu of rice with an output of 1000 jin of rice per mu. Second, the coordinated development of agriculture, forestry, livestock raising, sideline occupations, and fisheries will maintain the ecological balance, and promote consistently high grain yields. Forests preserve the water and the soil, and improve the farmland climate; the livestock industry can convert agricultural byproducts into meats and fertilizers; fish excrement can fertilize the fields. Third, across-the-board development of agriculture, forestry, livestock raising, sideline occupations, fisheries, and economic crops provides great benefits, and is able to provide funds for further production of grain, to change production conditions, strengthen the material and technical foundation, and promote consistently high output. Fourth is help in rational use of land. A change to the planting of economic crops on low output fields not suited to the growing of grain can bring high output. Such was the case in the growing of rice in the saline fields of Binhai, where annual yields were only between 500 and 600 jin per mu, and net profits only between 400 and 500 yuan. When changed to the growing of sugarcane, yields were between 400 and 500 ton per mu, and net profits were greater than 200 yuan. When rice was grown on sandy shallow fields, yields for each crop were between 400 and 500 jin per mu; when peanuts were grown, yields were more than 300 jin per mu (which translates to between 700 and 800 jin of paddy). Fifth, across-the-board development of the production structure for agriculture, forestry, sideline occupations, livestock raising, fisheries and economic crops helps achieve year round balance in the use of the workforce and of the means of production to tap production potential. With a proper mix between rice and sugarcane in sandy areas with a small population relative to fields, the shortage of workforce during the busy season in farming can be partly mitigated. On-time completion of the transplanting of seedlings can increase output by 10 or 20 percent as compared with missing the right time. Sixth, a smaller grain crop means that it can be cared for better for increases in yields per unit of area and the amount of capital and workforce invested, and for an increase in the level of intensification and care, thereby increasing per unit yields. Seventh, once economic crops and the livestock and fishing industries have been developed, with an increase in the amount of edible oil and meat, the composition of diet can be improved with a decrease in the amount of grain needed for consumption.

(2) Removal of the fetters of an economy self-sufficient in grain, enlivening of the commodity economy, and readjustment of the proportional relationship between grain and economic crops.

Expansion of the area of economic crops, and reduction in the area of grain crops, when looked at in terms of historical progress, will not only not reduce grain harvests, but can increase total grain output. It must be also realized, however, that readjustment of a long enduring single grain economy to become a rather rational structure in which grain and economic crops are mutually reinforcing will require a process as far as the province and its prefectures are concerned. Some grain reserves will also be required at the outset in order to make the conversion. This requires elimination of the fetters of a grain self-sufficient economy with suitable importation and transfer into the province of a certain quantity of grain so as to allow a little room for maneuver in readjustment. If, during the stage of readjustment, complete self-sufficiency in grain

were sought, it would be difficult to reduce the grain acreage to develop economic crops, and even more difficult to escape the vicious cycle. Thus the program of grain self-sufficiency should be changed to production to meet most of needs, with exchanges and transfers of grain playing an ancillary role (transfers by the state, exchanges with other provinces, and purchases by foreign trade units). The degree of production to meet needs should be able to assure that when the cutoff in transfers and exchanges occurs, there will be no danger of a grain shortage and hunger.

We propose a gradual shift over a period of about 5 years of 10 percent of the wetfield area (3.65 million mu) to economic crops, of which sugarcane and pulses (peanuts, peas, and beans) will predominate. Using the 1979 acreage sown as a base figure, sugarcane would be increased by 1.5 million mu to 4.22 million mu; and peanuts and soybeans would together increase by 1.5 million mu. At a calculated sown area of 3 million mu (two crops per year) plus the 1979 base figure, they would reach 10.75 million mu. Additionally would be an increase in silkworm mulberry, and fruit trees by a total of 650,000 mu. By these calculations, the crop structure following readjustment would show a ratio in the area sown to grain crops and economic crops of 7.2:2.8 (1979 base figure was 7.8:2.2). Furthermore, green manure could be developed to 12 million mu (not accounting for the sown area). Such a first step toward readjustment would be completed around 1985, and the number of bumper harvest years would increase more rapidly while the number of lean years would occur more slowly.

The beauty of this structure is that the rate of grain production for self use would remain very high, at 94.8 percent. The quantity imported would be limited; and there would be no danger of a grain shortage and hunger. Figuring an annual incremental population increase of 1.5 percent, within 5 years, the province will have 62.11 million people. At a rate of 680 jin of grain per person, 42.225 billion jin of grain will be needed. Output would be: first, following readjustment, the acreage sown to grain crops would still be 74.72 million mu. Using 1979 as the base year, and figuring an annual incremental increase in per unit yields of 3.7 percent (which is possible in terms of both historical and future conditions of development), a 20 percent increase would occur within 5 years, meaning 505 jin per mu, or a total output of 37.622 billion jin. Second, rotational cropping of sugarcane, peanuts, soybeans, and paddy rice can increase grain output. Figuring on the basis of the increase in area and scientifically verified increased output, an increase of 360 million jin of grain is possible. Third, in accordance with the policy of "a ton of sugar for a ton of grain," and figuring from the base figure for sugar output in Guangdong Province set by the Central Committee, and the amount of increase in sugar output following readjustment (calculated at 3.5 tons per mu), sugar could be exchange for 2.06 billion jin of grain. Using the above three figures, total grain derived would be 40.04 billion jin. Offsetting the amount produced against the amount required, there would be a shortage of 2.18 billion jin that would have to be imported. Should a bumper year occur, no imports would be required, and should a year of disaster occur, somewhat more would have to be imported. Even if imports could not be made, the average grain per capita would still stand at 645 jin, and there would be no danger of hunger for lack of grain. Second is a fair degree of increase in the economic crop acreage can enliven the economy, make the most of regional advantages, and substantially satisfy short-term national needs and improve the livelihood of the people. An increase in output of sugarcane by more than 1.5 million tons will go a long way toward

solving the national sugar shortage. In addition, there would be a general increase in the proportion of crops that nurture the soil. Third is the transformation of a viscious cycle into a benevolent cycle in which use of land and nurture of land would be rather well combined.

Peanuts, pulses, and green manure, which nurture the soil, would account for 52 percent of the total wetland acreage, and for every 2 mu of cultivated land there would be an average of 1 pulse crop, or an economic crop that revitalizes the soil used in crop rotation. Following readjustment, natural supplement of nitrogen in the soil would be quite good. On the basis of rough calculations (using 48.27 million mu of cultivated land and the anticipated yields per mu), the average consumption of pure nitrogen per mu per year is 33.5 jin while nurturing crops would return 18.9 jin of pure nitrogen to the soil. With the addition of 14.6 per mu of pure nitrogen, the amount used and the amount returned would be in balance, while on the basis of the 1979 crop structure, balance between the amount used and the amount returned could be achieved only by applying pure nitrogen at the rate of 22.9 jin per mu. This is to say that following readjustment of the crop structure, savings of pure nitrogen will average 8.3 jin per mu. In terms of the total cultivated land in the province, this totals 200,000 tons of pure nitrogen, or the equivalent of 1 million tons of ammonium sulfate. Fourth, economic benefits are quite high. Rough calculations (anticipated output and list prices for 1979) show that earnings from farming can increase 30 percent over 1979.

This shows that with the elimination of the fetters of complete self-sufficiency in grain, and conversion of 10 percent of wetlands to economic crops, striking changes can be made in the appearance of the entire farming industry.

(3) A combination of soil use and soil nurture, establishment of a sensible system of crop rotation and intercropping, maintenance of an ecological balance in the fields, and steady increases in the productivity of the soil. The essence of agricultural production lies in the transformation of energy. It is necessary to explore establishment of a crop rotation and intercropping system from the standpoint of the agricultural ecological system in pursuit of a rather fine ecological balance in the fields. Planting of a certain crop population on a certain area builds a farmland ecological system (though it is only a link in the total agricultural ecological system). The crop populations that play the dominant role in this system are under anthropogenic control. One has to set up a relationship among crop populations in accordance with the laws governing the cycle of matter and the transformation of energy that help combine soil use and soil nurture, and increase the light energy utilization rate while reducing the incidence of diseases and insect pests.

We appreciate that most places in Guangdong Province are suited for the spread of a rotational cropping and intercropping system of grain crops, economic crops, and pulse crops as 3 crops in 1 year or multiple crops in 3 years. In a system of 9 crops in 3 years, there could be 5 crops of grain, 3 crops of pulses and economic crops, and 1 crop of green manure. The specific method of rotational cropping would be adapted to specific locales in a wide diversity of ways. The advantages of this system are: first that it would largely be suited to Guangdong Province's need to both increase grain output and to plant more economic crops.

Second, the ratio of crops that use the soil and those that nurture the soil is 5:4, and it is possible to achieve a situation in which the more the soil is planted the more fertile it will become. According to research done by the Soil Fertility Institute of the Guangdong Provincial Academy of Agriculture between 1977 and 1979 at Zhenlong Commune in Huiyang County, following one crop rotation cycle in a 3 year 9 crop rotational system of grain crops, economic crops, and pulse crops, soil tests showed a gain in nutrients. The gain in nitrogen per year per mu was from 11.4 to 14.5 jin, for phosphate from 17.1 to 20.6 jin, and for potash from -1.9 to +4.7 jin. This means that that rotational cropping and intercropping system was able to bring about a gradual increase in soil fertility over the years. Third, it can both increase grain output and increase economic benefits, and the soil productivity rate is quite high. In the 9 crop in 3 years system of grain, economic crops, and pulses, annual grain output amounts to 1612.9 jin per mu (translated into unhusked grain), a 21.7 percent increase in output over the continuous cropping of rice in two seasons, for an average net provide per year per mu of 170.3 to 178 yuan, and a 24.1 to 29.7 percent increase over the dual season continuous cropping system for rice.

In places where economic crops are concentrated, and in some regions where natural and economic conditions permit, other suitable rotational cropping and intercropping systems should be promoted. For example, a system of rotation cropping of mulberry bases and fish ponds with sugarcane and fish ponds in watery places; a rotational system of rice and sugarcane for many years in sandy soil areas, and various rotational cropping systems employing tubers, pulses, corn, and such dryland crops in mountain areas.

In summary, readjustment of the crop structure has many ramifications. All sectors concerned should coordinate action to produce matching policies in their systems of management and economic policies. This is a key in the success or failure of readjustment, which must be diligently studied.

9432
CSO: 4007/343

BRIEFS

ECONOMIC CROPS--This spring Guangdong had an all-round bumper harvest in every type of economic crop. According to statistics, there have been increases in output over last year in soybeans, rapeseed, flue-cured tobacco and red tobacco all of which have been harvested. The proportion of increase for each crop is as follows: soybeans 7 percent, rapeseed 7.14 percent, flue-cured tobacco more than 34 percent and red tobacco 8.42 percent. Since last winter the rural commune members on Guangdong have fully utilized the winter slack season to plant economic crops on more than 1 million mu, an increase of more than 180,000 mu over the previous year. At the same time, because the production teams universally implemented every type of production responsibility system, planting went well, management was done well and output saw marked rises. [Text] [Beijing RENMIN RIBAO in Chinese 19 May 81 p 1]

CSO: 4007

CARE OF WHEAT DURING EARLY SPRING IN NORTHERN HEBEI DISCUSSED

Shijiazhuang HEBEI RIBAO in Chinese 9 Mar 81 p 2

[Article by Ning Shouming [1384 1343 6900], agronomist, Langfang Prefecture Institute of Agriculture: "Springtime Wheat Care Techniques for Northern Hebei"]

[Text] The area north of Baoding and Cangzhou in Hebei Province, including Langfang and Tangshan Prefectures, is the border region of China's winter wheat region. Let us discuss several major measures in the care of wheat during early spring on the basis of the lessons of experience of many years in the care of wheat in this region, and on the basis of this year's situation.

1. Rolling the wheat. Last winter brought scant rain or snow and temperatures tended to be high. The layer of soil subjected to alternate freezing and thawing was rather deep, and the repeated freezing and thawing of surface soil increased the cracks and crevices in the soil intensifying convection and diffusion of water vapor between the soil and the atmosphere, with the result that the abundant water condensed in the frozen layer of soil, evaporated, and was lost through the crevices as the frozen layer gradually melted. Therefore, urgent attention should be given use of large stone rollers to roll the wheat once or twice. This has the advantages of bringing forth moisture and conserving moisture by pressing the top (melted) soil against the bottom (frozen) soil, and reducing the number of large cracks in the surface of the soil, so that the abundant water content will collect in the cultivated layer to fill the needs of the wheat during the period of greening and coming out of dormancy, which is beneficial for root development and tillering. Second is to ward off wind and cold. Compacted surface soil not only reduces cold air convection, but also increases moisture content at tillering nodes, preventing sudden changes from cold to hot in spring and reducing the number of dead seedlings. If continuous high temperatures occur during late February, frequently greening will occur before it should, opening the wheat to damage from low temperatures during March. Consequently rush rolling once or twice must be done. If crevices are numerous or large, raking should be done first to fill them in; then rolling may be done. Rolling of the wheat should be done around noon or in the afternoon. If done under frosty conditions, seedlings are easily damaged. Alkaline-saline and wet soil is not suitable for rolling.

2. Cultivating the wheat. Cultivation of the wheat increases warmth, preserves moisture, and guards against cold. Cultivation of the wheat in early spring

promotes root development. It breaks up the hard layer produced by winter irrigation, and by winter and spring rains and snows, and it closes cracks to preserve moisture and prevent the wind from drying the roots. Therefore, in the case of winter irrigated wheatfields, fields that are excessively wet in spring, and saline-alkaline fields, cultivation should be done around noon or in the afternoon before the frozen soil has become unfrozen. Cultivation should be done to a depth of 0.5 to 1 cun, to loosen the soil thoroughly and completely. In low-lying fields and saline fields, where there is a lot of land relative to the number of people, raking may be done rather than cultivation to loosen the soil, even though raking may damage some seedlings. In wheatfields where seeds have been planted insufficiently deep, or where the soil is excessively dry, rolling should replace cultivation. This both helps work up moisture in the soil, and protects the seedlings. In the case of "soil covered with broken stalks," or "covered over seedlings," care must be taken about the time and the way in which the soil is uncovered. If the soil is uncovered and the soil around the plants cleaned up too early, cold damage may result; if too late, the seedlings may turn yellow. Analysis of meteorological data from various places shows that the time prior to 15 March is when low temperatures frequently occur. Lowest temperatures frequently reach between 5 and 17 degrees below zero, posing great danger for wheat seedlings that have already turned green. Therefore, debris should be cleared from around plants around 20 March, or even a little later in the northern counties. Raking away of debris from around plants may usually be done in two or three stages. During the first time, one-third of the excess dirt may be cleared away, and the remainder may be cleared away the second time. The third time is to clear the area around late and weak plants whose seeds had been sown too deeply to bring on tillering (tillering nodes should be covered with at least half a cun of soil to keep them safe). Attention should be given to "the need to scratch the soil after clean-up." The soil should be scratched loose since after the debris has been removed from the wheat seedlings, the surface of the soil, which has become hard and leathery, will allow moisture to escape.

3. Watering. Early spring watering is very important. Briefly, there are "three concerns in watering," namely concern for the soil, for the sprouts, and for water resources while watering early, in mid-season or late. By concern for the soil is meant concern for changes in the wheatfield soil caused by the freezing of the soil. Large area watering should begin after thawing is complete in early spring rather than some conventional time of a given month. If watering is done before thawing is complete, water may accumulate and displace air in the soil and cause damage when it freezes, frequently resulting in a cessation of growth or death of seedlings. Concern for seedlings means determining the sequence in which fields will be watered on the basis of how much tillering has taken place in individual plants and how soft or hard (weak or sturdy) the tillering nodes are. The big, sturdy seedlings should be watered first, with the weak and late growing seedlings and seedlings on alkaline-saline soil being watered somewhat later. In the case of late growing wheat (wheat that has not tillered or has only one small tiller), in particular, beginning of watering should be delayed until new roots (secondary root growth) are half a cun long, and new tillers (latent tillers) begin to show above ground (usually around 5 April). This is because the main problem late growing wheat has in early spring is insufficient warmth and a lack of air. If watering is done too early,

serious consequences may result such as the ground becoming cold, the soil hardening, roots becoming waterlogged, and alkali being brought to the surface of the ground. This year there are numerous wheatfields that were sown quickly to take advantage of existing moisture and that were not irrigated during the winter. While wintering over, the weak or late developing wheat sprouts were in soil that did not become frozen or was only "brittle frozen," so they require early watering with "life-saving water." Care should also be taken not to water too much, and to loosen the soil to disperse the water right after watering. Concern for water resources: Watering times should be set up on the basis of different conditions as to availability of water, size, and work force available in wheatfields in various places. In communes and brigades where water resources are poor, watering should begin immediately after thawing, priority for watering being assigned according to the state of the wheat sprouts. Strict attention should be given the time for rush watering so as to enlarge the area irrigated. Places where water resources conditions are good should wait until thawing has occurred and dormancy is broken. When the air has warmed and soil temperature has stabilized at 5°C to a depth of 5 millimeters is the most suitable time to begin watering. This year's forecast calls for an earlier than usual thaw; therefore, attention should be directed to earlier preparations for watering.

4. Fertilizer topdressing. As regards the time for early spring topdressings of fertilizer, some people are proponents of early applications in icy conditions, while others advocate combining fertilizer application with spring rains. General practices should be adapted to local situations in this regard. In addition, use of the practice of "sunning manure in ditches" brings excellent results. The essentials of "sunning manure in ditches" are as follows: Sun the manure in an open ditch for from 3 to 5 days (if the soil is excessively dry, sunning may be omitted). Before the wheat has come out of dormancy, that is 3 to 5 days before watering, open ditches for every other row to a depth of 2.3 to 3 cun deep. On the day of watering, spread high quality manure, and phosphate and nitrogenous chemical fertilizer along the ditches, covering them with soil at once to close them, and then water. This brings very good results in starting growth of phosphate-poor "small old sprouts" growing in infertile, low-lying and wet, or alkaline-saline soils.

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MEASURES FOR DEVELOPMENT OF AFFORESTATION OUTLINED

Shihjiazhuang HEBEI RIBAO in Chinese 12 Mar 81 p 1

[Editorial: "Seize the Opportune Moment To Develop Afforestation"]

[Text] Now that the warm spring winds are reviving nature, the golden moment has arrived for taking up the work of afforestation. We should make a serious effort to implement the "Announcement Concerning the Vigorous Launching of Springtime Afforestation" recently issued by the provincial government, get on with the work without delay, take advantage of the opportunity to launch a high tide of springtime afforestation, and speed up the greening of the vast expanses of Hebei. This is a glorious and pressing mission now awaiting fulfillment by the people of the entire province.

Our province is one which is poor in forestry resources. There are throughout the province 25 million mu of forests, or the average of only 0.49 mu per person. This is only 2.5 percent of the average 1.95 mu for each person nationwide. The total amount of timber in reserves for the province is 47 million cubic meters or an average of 0.93 cubic meters per person. This is 8.8 percent of the average 10.6 cubic meters per person nationwide. Only 13 percent of the province is forested, or only half of the standard set for the nation. On top of that, the forested areas are not evenly distributed, and not a few have suffered severe damages. The backward state of forestry in Hebei has naturally resulted in an imbalance in the natural ecology, the gradual deterioration of climatic conditions, the frequency of floods and droughts, the worsening of damages caused by water and soil loss, the perennial low yields and instability of agricultural production and the extreme shortage of lumber and other wood products. Whereas the annual quantity of lumber needed by the province amounts to 1.3 million cubic meters, it is capable of producing only 20,000. This considerable discrepancy constitutes a weak link in the development of the national economy. Experience indicates that the development of forestry not only contributes to the supply of lumber, energy and various forestry byproducts, but, more significantly, to the maintenance of the vitally important ecological balance so necessary for insuring a favorable environment for human beings and high and stable yields in agriculture and animal husbandry. For this reason, the development of the forestry industry through afforestation is a must for agricultural development, a strategic measure for reshaping the natural elements and an immense task that is certain to redound to the benefit of present and future generations. The importance of raising the forestry production cannot be overemphasized in the context of the continuing readjustments to the national economy.

In order to do afforestation well, it is utterly necessary that we correct the "leftist" mistakes, continue to liberate our thinking and implement the forestry policy of the party. The party's policy on forestry had been seriously subverted during the 10-year period of turmoil. In order to undo the "leftist" errors and to put the forestry industry back on the right track, it is of utmost importance that we should seriously implement the party's policy on forestry and, in line with that policy, mobilize tens of millions of people to engage actively in afforestation. We must put the main responsibility on the commune and brigades, develop vigorously state afforestation projects, encourage commune members to engage in tree planting as a matter of policy, support the party policy of allowing those who plant the tree, own the tree and simultaneously look after the state, collective and individual interests. At the same time, it must be understood that forestry production is a long-term project and that it cannot be expected to bear fruit unless we are prepared to work relentlessly and under difficult conditions over a period of years. For this reason, we must hold on to the policy in a steadfast manner over a relatively long period of time. The rights to the ownership of timber should be established on the basis of the recognized rights prevailing at the present time. At the moment, it is particularly important that we should establish and perfect a system of responsibility for forestry production. This is crucial to the development and protection of the forestry industry. When the system of responsibility in agricultural production was in the process of being formulated, the failure on the part of some areas to grasp in a timely manner a system of responsibility for forestry production resulted in further damages to the forestry industry. This state of affairs indicates that while the work of political ideology is being intensified, it is also necessary to adopt rational economic measures to motivate the enthusiasm of the masses to engage in afforestation. The standards for linking remuneration to production and the method of remuneration in a responsibility system for the forestry industry must be set realistically and on the basis of the locality and the type of forests and trees. The people through discussions are to set the standards which are to remain valid over a certain number of years. Care must also be taken that collectively owned trees and forests, orchards and mulberry farms not revert back to private ownership in abuse of the system of responsibility.

To do a good job of afforestation, it is essential that measures for the control and protection of forests should be strengthened to prevent the unauthorized and random felling of trees. Some time ago, the prevalent practice of felling trees at random and of unauthorized transportation and sale of lumber resulted in serious damage to our forestry resources. Unless such abuses are quickly brought to an end, our forestry resources will suffer not only a serious setback which would create shortages of lumber needed for national construction and for daily use by the people, but also have damaging effects on the ecological balance and the wellbeing of future generations. We can afford no further delay in adopting decisive measures for the protection of our forestry resources. At the same time as the governments on various levels are vigorously engaged in afforestation, they must attach importance to implementing the urgent announcement issued by the State Council on resolutely halting the random felling of trees, protect well our forestry resources and grasp afforestation with one hand and management with the other. The governments on various levels must, in coordination with the "five stresses" and "four beauties" campaigns now in

progress, teach the masses to emulate Lei Feng in setting up a new style, in ushering in a socialist spiritual civilization, in taking good care of our forests, in planting trees on an extensive scale and in creating a beautiful and healthy environment. The chief culprits guilty of damaging the forests should be brought to court. The responsible parties who protect or support those guilty of damaging the forests must be held accountable. Those who are guilty of violating criminal laws must be made to pay the penalty. At the same time, recognition and reward must be given those units and workers who have done a good job of protecting the forests so that the evil practice of unauthorized felling of forest trees may be promptly brought to an end.

To do afforestation well, it is essential to strengthen the leadership of party committees and governments on various levels. The evidence over a period of years indicates that the development of the forestry industry shows the most notable results where the leadership in the forestry industry is sufficiently knowledgeable and indefatigable in its efforts. Conversely, the evidence also shows that the forestry industry is most unproductive where the leadership is lacking in determination and a correct understanding of the forestry industry and where it is marked by laxity. For this reason, it is vital that our comrades in every level of the party and the government should treat the forestry industry as an important item on their agenda and to come to grips with the problems several times a year to make sure that progress is made. One who has worked in a locality a number of years but who has not made a dent in afforestation is not a good leader and has not measured up to the expectations of the party and the people. We must bring into full play the enthusiasm of scientific and technical personnel and strengthen the leadership of technical workers in afforestation. All the trades and industries must participate in afforestation and to fulfill their own responsibilities within the time limit set by the local government. The leaders of the People's Liberation Army must actively participate in planting, cultivating and protecting forests. In addition to engaging in the greening of their military districts, they must also consider their participation in the work of afforestation in their localities as an important part of the task of socialist construction. The large numbers of young people constitute an enthusiastic and active new force. The Communist Youth League organizations on various levels as well as primary and middle schools should make further efforts to organize the young people in planting trees and forests as well as grass and flowers. They should be taught to take the greening of their country as a proud duty and to vie for the honor of being shock troops in the work of afforestation and vanguards in the protection of the forests.

Opportunity, once lost, will never return. We must adopt the heroic stand that "a determined effort can work wonders in the transformation of China," raise to a higher level the spirit of self-reliance befitting fearless and indefatigable revolutionary pioneers in planting trees and forests for the benefit of future generations and direct our efforts toward meeting the challenge of speeding up the greening of the vast expanses of Hebei.

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BEIJING MUNICIPAL LIVESTOCK BUREAU ANSWERS QUESTIONS ON QUAIL RAISING

Shijiazhuang HEBEI RIBAO in Chinese 10 Mar 81 p 2

[Article by Wang Daying [3769 1129 5391], Science and Technology Department, Beijing Municipal Livestock Bureau: "Quail Production Feeding and Care Techniques"]

[Text] Editor's Note: On 20 December last year, after this newspaper published a report titled, "Great Prospects for Quail Raising," numerous letters were received asking about techniques for the feeding and care of quail. A draft written by Comrade Wang Daying of the Science and Technology Department of the Beijing Municipal Livestock Bureau and titled, "Techniques for the Feeding and Care of Quail" is published below for use as reference everywhere.

The raising of quail is indeed a sideline occupation with great prospects, but production should be undertaken with the requirements of the domestic and foreign markets in mind, and blind action avoided in order to prevent economic losses resulting from excess production that cannot be marketed.

Quail are a class of birds, belong ng to the order of galliformes, the family of pheasants, and the genus of quail. These birds have a brown body with that of the females being speckled from throat to breast, and that of the males having dark, unspeckled breasts. Adult quails weigh between 120 to 160 grams, with the females weighing between 20 and 30 grams more than the males. Quails have a short reproductive cycle and sexual maturity is extremely early, egg laying usually beginning within 40 days. Under favorable feeding conditions, annual output may reach more than 250 eggs, with eggs averaging 12 grams in weight for a total annual output of 6 shijin. Adult females daily consume an average of 24 or 25 grams per bird, requiring 17 shijin of concentrated feed per annum. The egg to feed ratio is approximately 1:2.8, or roughly the same as the egg to feed ratio for chickens. The meat to feed ratio for quail raised as food is 1:3-4, which is not as high as the return on feed fed to chickens; however, since quail meat commands a high price, the return is somewhat greater.

The incubation period for quails is 17 days, and body weight of chicks at time of hatching is about 6.3 grams. Fairly high temperatures are required to raise the chicks. Temperature levels in quail coops should be as follows: for the first 3 days 40-38°C; reduced to 35°C on the 7th day, to 30°C on the 14th day, to 25°C on the 21st day, to 20°C on the 28th day, and at 20°C on the 35th day. Relative humidity in the coops should be maintained at 55-65 percent. Ventilation requirements are 6 cubic meters per kilogram live weight per hour. Light levels are: 24 hours of continuous light for the first 3 to 5 days after hatching at an intensity of 4 watts per square meter. As the chicks get older, the amount of light may be reduced to 14 or 15 hours at an intensity of 1-0.5 watts. Density of flock for the first 21 days should be 150 chicks per square meter, and after 21 days between 70 and 80 fowl per square meter. For the first several days, the chicks should be provided with the best possible conditions. If they are fed and cared for well, their incubation rate will reach 68 percent and their survival rate 90 percent. Maturity rate may reach 95 percent. If care is neglected, within 3 to 5 days following hatching the death rate may amount to 50 percent.

After hatching, the young chicks should be placed in a brooder in which the temperature has been previously regulated, where they can be calm. Next, warm water should be placed in a watering device so they may first drink a little warm water to refresh themselves. Feeding can then begin gradually. At feeding time, first feed with crumbled hardboiled egg yolk (1 egg yolk per 10 chicks), and some chick feed spread on a cloth from which they may peck it. After an hour's time, remove both the remains and the cloth. Beginning on the second day, place only the chick feed on the cloth, placing feed in the feeding trough at the same time. Five days later, feed may be placed only in the feeding troughs. Young quails around 1 week old should be fed 4 times daily. Adult quail should usually be fed wet mixed feed (feed and water in a proportion of 1:1.8) three times daily. Chicks under 10 days old should receive chick feed consisting of 24 percent coarse protein. Beginning from the seventh day, feedings should begin gradually with laying quail feed containing from 20 to 22 percent coarse protein. On the 13th day, the feed may be entirely quail feed.

Feeds formulated for quails require a 5 to 6 percent higher protein content than for chickens, and requirements for animal protein are higher as well. For the proportions used in two feeding formulas used by the Beijing Municipal Quail Farm, please see the following tables.

	Ingredients							
Category	Corn	Bean cake	Fish meal	Wheat bran	Leaf meal	Bone meal	Grit	Total
Young quail	54	25	15	3.5	1	1.5		100
Laying quail	50.5	22	14	3.5	4.2	2	3.8	100

Amount of Feed as Shown: Units (grams/fowl per day)

Category	Days old												
	Newborn	3	5	7	9	11	13	15	17	19	23	27	31
Young chicks feed	1	3	6	6.5	4	2.5							
Laying quail feed				1.5	6	9.5	13	14	15	16	18	20.5	21

Laying quail are usually raised in baskets with the ratio of baskets for males and females being 1:3. The baskets are 20 centimeters high and made of a 12 to 13 millimeter wire mesh. Laying quail coops with a temperature of 20°C are most suitable. When temperatures are lower than 15°C, molting of feathers may occur, and when temperatures exceed 35°C, egg production declines. After an adult hen has laid for a year, it should be culled. Diseases to which they are prone include xincheng yi [2450 1004 4004], malikeshi disease [7456 4539 0460 3044 4016], quail plague [7718 4054], and qiuchong disease [3808 5722 4016], as well as digestive and breathing system ailments. Timely inoculations, medical prevention and epidemic prevention disinfecting work must be done to insure that the quails will be healthy, safe, and productive.

Those desiring to purchase laying quails may directly contact the laying quail farm of the Beijing Municipal Domestic Fowl Farm. Another address is: Dongshagezhuang, Changping County, Beijing.

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BRIEFS

BUMPER COTTON CROP--Provincial authorities concerned told us yesterday that the total cotton output for Hebei in 1980 was 494 million jin, a 263 million jin, or 1.1-fold, increase over the 231 million jin of the previous year. This was a bumper harvest such as Hebei Province has rarely seen during the past several years. As of 25 February, 469 million jin of ginned cotton had been procured throughout the province. This plus the exchange procurement of 15 million jin means a total of 484 million jin for a 66.8 percent overfulfillment of procurement quotas, and a 261 million jin increase in procurement and exchange procurement over the same period last year for a 117 percent increase. [Text] [Shijiazhuang HEBEI RIBAO in Chinese 9 Mar 81 p 1] 9432

RECORD SHEEP STOCK--Provincial authorities told reporters yesterday that the number of sheep and goats in inventory in the province in 1980 had set the highest record in history. According to statistics, the number of sheep and goats in inventory in the province at the end of the year came to 8,149,000, or 861,000 more than the 7,288,000 figure for the previous year. This represents an increase of 11.9 percent. This is 152,000 more than the highest record of 7,997,000 achieved in 1962 or a 1.9 percent increase. Because of the increase in the number of sheep and goats last year, there was also a notable increase in the number of sheep and goats taken out of inventory. At the end of 1980, the number of sheep and goats taken out of inventory came to 1,749,000, or 357,000 more than the 1,392,000 for the previous year. This represents an increase of 25.7 percent. [Text] [Shihjiazhuang HEBEI RIBAO in Chinese 12 Mar 81 p 1] 9621

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SEVERAL PROBLEMS ON GRAIN PRODUCTION DISCUSSED

Huanggang HUBEI NONGYE KEXUE [HUBEI AGRICULTURAL SCIENCES] in Chinese No 3 Mar 81 pp 2-6

[Article by Wen Boying [5113 0130 5391], Grain Crop Institute, Hubei Provincial Academy of Agriculture: "Discussion of Several Problems in Hubei Province's Grain Production"]

[Text] In the 30 years since the founding of the Chinese People's Republic, Hubei Province has made tremendous achievements in grain production. In 1979, grain output totaled 36.99 billion jin, a 2.2-fold increase in grain output as compared with 1949, and an annual incremental increase of 4 percent. Average grain per capita rose from 448 jin to 779 jin, yet needs of the state and of the people's livelihood for increased grain could not be satisfied. Consequently, we must continue to place growth in grain output in a primary position; otherwise, rapid development of the livestock industry and changes in the composition of our diet will not be realized. Increased grain output is the foundation for development of diversification. It is the foundation of the five industries [agriculture, forestry, livestock raising, sideline occupations, and fisheries], but that is not to say that agriculture is synonymous with grain. Agriculture must gradually combine composite agriculture (the farming industry) and transformed agriculture (the livestock industry). The two are mutually supportive and mutually restrictive.

Here follows several problems in grain production in Hubei Province, about which some views are talked about and provided for discussion.

1. The Grain Growing System Must Follow Climatic Laws

Climatic conditions vary from place to place, and agricultural production must adapt general methods to local conditions, or otherwise sustain the penalties of nature. Hubei Province is located in the middle reaches of the Yangtze River, and the difference in its latitude from north to south is about 5 degrees while the difference in its latitude is about 7.3 degrees. The transience of the macroclimate is marked. Average amount of sunlight throughout the province is from 1,150-2,245 hours; average annual temperatures are 15-17°C, and accumulated temperatures greater than or equal to 10°C are 4,900-5,400°C; the frost free period is 230-290 days; annual rainfall is from 750-1,550 millimeters with the distribution great in the south and less in the north, with 70 percent of the rainfall being between April and September. In short, light energy is sufficient, quantity of heat abundant, rainfall copious, the rainfall and the warmth occurring in the same

season, and the types of climate varied, making the province suitable for the growth and development of all kinds of grain crops. But climatic changes are rather complex and inconsistent. In the spring season, for example, temperatures may suddenly drop, frequently resulting in the rotting of rice seedlings and the death of plants or their delayed development. In the autumn, the cold dew wind causes a high rate of empty glumes in the late rice crop. When rainfall is uneven, waterlogging or drought results; serious drought or serious waterlogging occurs on an average of once every 3 or 4 years, and small droughts happen every year. Inasmuch as climatic factors are not amenable to control by man over large areas, in developing grain production, one has to do whatever the characteristics of the climate dictate, capitalizing on advantages while avoiding disadvantages, and making fullest use of the strengths of local climatic resources as the only way to win optimum economic benefits.

Quantity of rainfall in Hubei Province between March and May at various longitudes shows the largest amount falling in the south (400-550 millimeters) and least in the north (200-300 millimeters), with the south getting between 1 and 1.5 fold as much as the north. North of 31°N longitude, spring rains are slight, and particularly rare is continously rainy and overcast weather. But sunshine is copious and the difference in temperatures fairly great, which is extremely favorable for the blossoming and coming into milk of the wheat, making it easy to win consistently high outputs of wheat. For example, the 4.81 million mu of wheat in Xiangyang Prefecture produced yields averaging 326 jin per mu in 1979. Furthermore, during July and August, sunshine in this prefecture is at its strongest, just at the time when photosynthesis is most vigorous in the mid-season or single season late crop of rice. Consequently, development of a two crop system of wheat and rice, wheat, green manure and rice, oil bearing crops and rice, or beans and rice is an advantage this prefecture possesses in grain output. Since the macroclimate is rather good in some places in this prefecture, the growing of two crops of rice on a fixed area is helpful both in increasing grain yields and in staggering work.

Northwestern Hubei is rarely troubled with flooding, but suffers from spring drought as well as frequent summer drought. Ever since the 1970's, this prefecture has changed its dryland cropping from wheat followed by corn to the intercropping of wheat and corn, and its wetland cropping to a two crop system of wheat and rice, which has both taken advantage of climatic conditions for the growing of wheat and has avoided stifling dryness for the corn crop and autumn cold for the mid-season rice.

In southwest Hubei, both drought and flooding are lighter than elsewhere in the province, but during spring southwesterly warm humid air currents are rather brisk. Year in and year out, the cold and warm air masses converge to the south of the Yangtze River, and this plus the mountain topography produces a great amount of rainfall, little sunshine, and high humidity, which is not favorable for the blossoming and coming into milk of the wheat. Cereal scab is serious. For this reason, the intercropping of tuber crops with corn on drylands is better than the intercropping of wheat and corn. The wetlands are suited to the spread of a two crop system of tuber crops and rice, or oil bearing crops and rice. But owing to a desire to plant too many sweet potatoes, disease resistant wheat varieties may be selected as part of a crop.

Southeastern Hubei, the Jianghan Plain, and areas along the Yangtze River receive a substantial amount of spring rain, and intermittent drizzles in the Yangtze River area endure for a long time. Summer brings high temperatures and little rain, and cold weather comes late in the fall. In fact, between late June and mid-July serious flooding frequently occurs. But these disasters have a good side too in that water resources are abundant, and with rational water conservancy facilities, an evil can be turned into a good to make up for the high temperatures and little rainfall from mid-July to mid-September. In this region, the chill of autumn comes late and the safe period for production is fairly long. This plus an abundant workforce makes for the development of two crop crops of rice or a three crop system. The better than 80 percent guaranteed arrival time of the autumnal cold dew wind is 23 or 24 September in southeastern Hubei, and 20 September on the Jianghan Plain and in areas along the Yangtze River. Full use of the advantageous climate of these areas for the growing of two crops of rice or a three crop system is correct. As a result of the fairly heavy rainfall in this region during April and May, the between 5 and 6 million mu of wheat here frequently develop diseases (principally cereal scab), or become waterlogged. With perseverence in the building of ditches to lower the underground water table, the selection of disease resistant varieties, and the intensification of chemical prevention and control, this problem should not be hard to solve.

2. Stabilization of the Grain Growing Area and Increase in the Multiple Cropping Index

Hubei is a province with little land relative to its population. Cultivated land in the province amounts to 1.24 mu per capita or an average of only 1.45 mu of cultivated land per person engaged in agriculture (as calculated from 1978 statistics). Furthermore, in view of the need to implement policies pertaining to private plots, the need to develop economic crops, and the additional need to take some cultivated land out of production for reversion to forests or lakes, the rational use of the existing cultivated acreage becomes even more important. With steady future improvements in the conditions of production, particularly in the steady increase in levels of mechanization, given suitable natural conditions, economic conditions, and technical conditions, steady development of the three crop system, vigorous increase in the two crop system, gradual curtailment of the one crop system (currently more than 8 million mu of wetlands grow one crop a year), fully effective use of heat and light resources, soil resources, and workforce resources, and increased multiple cropping is still a major avenue for development of grain production. Analysis shows a wetlands multiple cropping area of 24.63 million mu in 1949. By 1979, multiple cropping in old wetlands rose to 37.38 million mu, an increase of 12.75 mu. On the basis of an average 617 jin per mu output from the acreage planted to rice in 1979, the more than 7.8 billion jin increase in paddy amounted to more than 40 percent of total increased output.

During the past 3 years, the double rice crop area in Hubei Province has undergone some readjustment. This is necessary and readjustments should be actively made. In 1977, the area sown to paddy rice in the province stood at 46.3 million mu. In 1980, this fell to 40.16 mu, a reduction of 6.24 million mu. In 1978, the wheat acreage was 15.38 million mu, and in 1980 it was 19.53 million mu (summer harvest) for an expansion of 4.15 million mu. The expansion in wheat acreage was done on wetlands, the one offsetting the other, but the area sown to rice still dropped by

more than 2 million mu. A look at the situation in Jingzhou Prefecture during the past several years shows a 2 million mu downward adjustment in the late rice crop of the two rice crop system, and the expansion of wheat growing to 1 million mu of wetlands for a 1 million mu loss in the grain growing acreage. This problem should arouse conscientious study at all levels of the People's Government. We cannot unconditionally convert from two crops to one crop or suppose that two crops of rice are not appropriate and switch to a two crop system for something else. Quite the contrary, where conditions permit, it is necessary to steadily increase the multiple cropping index with more crops for more harvests. In short, henceforth the grain growing acreage should be stabilized and efforts made for gradual increase to a higher level from the current 207 percent multiple cropping in the province.

While increasing the multiple cropping index, the relationship between use and nurture of the soil should be well handled. Increase in the multiple cropping index and reform of the cropping system is for the purpose of making fullest use of the land. At the same time it is also necessary to give attention to active nurture of the land. To nurture but not to use is to lose the point of nurture and will not lead to the objective of increased output. To use and not to nurture, in the adoption of production through plunder, will not long maintain increases in output. Under present conditions, special attention should be given to organic nurture of the soil. Therefore in the course of rotational cropping, attention must be given to "manure" (green manure), "beans" (pulses), and "oil" (rape), making sure that one such crop is planted in each rotational cycle. In places where labor is scant relative to the expanse of fields, in ricefields for example, every effort should be made to institute a two crop system of wheat and rice, rape and rice, or beans (soybeans or broadbeans) and rice, and separate rotational cropping of green manure and rice, wheat, green manure (fine duckweed, or mung beans) and rice, and green manure-rice-rice. Where climatic conditions are good and the workforce is large relative to available land, in addition to increasing per unit yields from two crops of rice, a three crop system should be steadily developed principally consisting of the rotational cropping of rape-rice-rice, but also wheat-pulses-rice-rice. The rotational cropping system should develop from a single crop population to multiple crop populations. This is a foremost characteristic of China's "ecological agriculture." Only in this way can both the soil be improved and its fertility enhanced, and can there be fixed periods of winter farming and winter plowing of the soil without using it to grow crops, and rotation between wet and drylands to reduce secondary incubation in the soil, thereby reducing diseases, insect pests, and weeds to achieve the goal of increased grain output, increased economic benefits, and improvement in the nutrition and edible oils for the masses.

If rapeseed cake and rape stems are returned to the fields, with the nutrients absorbed by the soil rather than being taken away, this can supply needs for one rotational crop. People are aware of this, but sufficient attention has not yet been aroused about the production of pulses. In 1979, the soybean acreage in Hubei Province was 3 million mu, about what it was in 1949, and total output was at the 1953 level--somewhat more than 500 million jin. In 1979, the broad bean and field pea acreage was only 2.01 million mu, a more than 2.8 million reduction from 1949. Output was 420 million jin, the same as for 1949. Yet pulse crops are natural chemical factories and a good rotational crop for nurturing the soil. This is particularly the case with soybeans, which have long been a source of protein

in the nutrition of the people of China. The masses say, "Green vegetables and beancurd and all is well." This is very reasonable. Therefore, it is necessary to build a position for pulse crops in rotational cropping.

3. Make the Most of the Advantages of Paddy Rice Production

Total output of grain in Hubei Province derives from summer wheat, paddy rice, and grains other than wheat and rice. The province has somewhat more than 29 million mu of wetlands amounting to 52 percent of the total grain crop area, and paddy rice output amounts to more than 70 percent of total grain output. Therefore, when Hubei Province sets about intensifying the pace of grain production, it must first do a good job of rice production. Naturally every area has its own strengths. In places where summer wheat occupies an important position, for example, by giving attention to summer wheat, the "summer bolsters the fall." However, in terms of the province as a whole, fullest use must be made of the advantages Hubei Province provides for the growing of paddy rice.

Ever since 1976, rice output has stagnated, making no forward movement. The present situation is as follows: Early season rice produces high output fairly consistently; mid-season rice output is consistent but not high; and late season rice output is low and inconsistent. Early season rice output should move from its presently high level to an even higher level, with per unit yields reaching or approaching 800 jin within a short period of time. Figuring an early season rice acreage of somewhat more than 13 million mu, total output would then reach 10 billion jin. In 1977, Xishui and Huanggang counties realized this goal.

Paddy rice production appears to have two weak links. One is mid-season rice, and the other is late season rice. In 1966, following promotion of short stem varieties for the mid-season crop, per unit yields suddenly broke 500 jin, and when late maturing variety "691" and hybrid rice was promoted as the mid-season rice during the 1970's, per unit yields broke 700 jin. For several years in a row, Jingzhou Prefecture got more than 800 jin. This shows that mid-season rice is not a low yield crop; the problem is that it has not been handled right. The masses make the criticism, "two crops of rice are the doing of officials, but mid-season rice is the doing of the people." Under the influence of the ultra-leftist line, not only was attention not given to mid-season rice, but rather it was criticized and even became a blank spot as far as research was concerned. During the past several years, some readjustment has been made in crop patterns, and the mid-season rice acreage has increased. In 1979, the province's mid-season rice acreage was 14,792,000 mu (including single season late rice), and yields were 728 jin per mu. Inasmuch as "fields to help the key link" [fields for which yields were inflated] were numerous, actual yields were only 600 odd jin per mu. With the currently widely planted "691" and hybrid rices, the potential per unit yields are in excess of 1,000 jin. All that is needed is proper sequencing of crops, good matching of varieties, fertilizer enough to keep up with planting, and good care, and yields of from 8000 to 9000 jin per mu can be harvested. Were we to take in hand mid-season rice production in the same way as early season rice production has been taken in hand, within 2 or 3 years, increase of yields of 800 or 900 jin per mu would be very much possible, thereby deriving between 12 and 13 billion jin total output from the mid-season rice crop. In rice production, mid-season rice occupies first position. Consequently, it is necessary to regard mid-season rice

seriously, do a good job of growing mid-season rice, and make full use of the potential for increased yields from mid-season rice.

In Hubei Province, one-third of the rice acreage consists of late season rice in a two crop system, but output is only one-fourth the total rice output. Yields hovered around 300 mu per jin for 13 years, breaking 400 jin only in 1979. This is a seriously weak link in Hubei Province's rice production. Yields from the second season late rice can, as both a theoretical and a practical matter, catch up with those of early season rice. So why don't they ever go up? Reasons are numerous, of which the shortage of fertilizer is a conspicuous one. Second is a problem with the seasons. In some places because of a lopsided emphasis on high output from the early season crop, excessive acreage is devoted to late ripening varieties. Mid-season rice cannot be planted early enough and commensurate measures cannot be taken to catch up in the later generation, with the result that much of the transplanting of second season late rice is done too late. The period for heading often coincides with the cold dew wind, resulting in reduced output. Another problem is the wide area sown in seedling fields and the poor quality seedlings resulting. After they are transplanted, they cannot stand the high temperatures, making difficult the preparation of conditions for a bumper harvest. Additionally is the problem of disease and insect pests, and damage from the brown leaf hopper is particularly serious. If conscientiously taken in hand, these problems would not be hard to solve. Particularly requiring close attention is use of chemical fertilizer for the late rice crop, with standard nitrogenous fertilizer being applied at the rate of 50 jin per mu. This, plus other measures to catch up could increase yields for late rice to from 500 to 550 jin per mu, and total output could reach more than 7 billion jin. The weak link of second season late rice is obvious, and all that is required is to seize hold of the problem and per unit yields can quickly overtake those for early season rice.

4. Gradual Establishment of a Technical System for Consistent Output, High Output, Superior Quality, and Low Cost

The objective in the modernization of China's agriculture has as its central focus increase in the soil's yields per unit of area over a fairly long period of time, and gradual increase in the productivity of labor. This requires emphasis on the use of achievements in modern agricultural organic science to reshape agriculture, and the promotion of all forms of effective traditional practices for increasing output. Additionally, modern industry must be used to equip agriculture. It is necessary, as well, to continue water control, soil improvement and such capital construction in agriculture for the gradual building of a fine ecological environment in agriculture and the establishment of a technical system for consistent output, superior quality, and low cost. Our preliminary view is that in rice production, the following rather complete technical system must be established: "Dominant fields" are the foundation of production; "dominant fertilizer" is a condition for high output; "dominant seeds" are an integral part of high output; reasonably close planting is at the core of high output; breeding of sturdy breeds is a prerequisite for high output, management of water and fertilizer is a key link in high output, and prevention and control of diseases and insect pests is an assurance of high output. Below, only a few of these aspects of the problem are discussed.

1. Intensification of construction in the fields. Reshaping of ridged (and alluvial) fields, cold waterlogged fields, winter waterlogged fields, and gradual

reduction in the number of fields that lie idle during winter and the number of fields where winter crops do not do well, in order to create conditions for the development of a double and triple crop system. There is currently about 6 or 7 million mu of such backward fields in the province producing only 400 to 500 jin per mu. Unless they are improved upon, talk of planting wheat and rape in wetland fields and of increasing the multiple crop index and rotational cropping is a lot of empty words. Therefore, it must be decided to do something about "ditches" first of all, to lower the underground water table and to achieve both drainage and irrigation so that the fields may be made wet or dry.

2. Strict attention to a build-up in fertilizer. The main reason for the not very high level of per unit yields is still the insufficiency of fertilizer. An urgent task in the build-up of fertilizer capacity is attention to chemical fertilizer production. Statistics from Jingzhou Prefecture on the quantity of nitrogenous fertilizer used between 1969 and 1978 averaged 16.5 jin per mu. In 1980, it was 23.6 jin (nitrogenous and potash fertilizer mixed). This shows that the quantity of fertilizer used is still very low. Were the quantity of nitrogenous fertilizer used to be increased to 70 jin (standard fertilizer) per mu, grain output in Hubei Province would increased tremendously.

In order to augment organic fertilizer and increase application of chemical fertilizer, and in order to increase the supply of nitrogen in the soil, more attention must be given use of organic fertilizer. Fundamentally, the first way to increase organic fertilizer is to return stalks and stems to fields (developing methane gas production in conjunction with this to solve the rural fuel problem), and attend to green manure production. In places with numerous fields relative to the workforce, and in places with a large mid-season rice acreage, sensible arrangements have to be made about the kind of green manure varieties to be used, using Chinese milk vetch in conjunction with early rice, and lanhua caozi [5663 5363 5430 1311] or jianshe field peas [0494 5286 6261 6258] in conjunction with mid-season rice.

The problem of imbalance among nitrogen, potash, and phosphate must also be solved. In 1978, China's proportional output of nitrogenous phosphate, and potassium fertilizer was 1:0.28: 0.002 (In Japan and in Europe it was 1:1:1). In many parts of Hubei Province, fertilizing with potassium fertilizer has brought very good results, but sources of supply are lacking. Fertilizing with nitrogenous fertilizer alone not only impairs output and quality of grain crops, but also strikingly reduces the role of nitrogenous fertilizer itself in increased output. Consequently, while giving attention to the production of nitrogenous fertilizer, it is also necessary to give serious attention to production of phosphate and potassium, and production of potassium fertilizer, in particular, should be put on the agenda.

Fertilizing methods very much merit study. We advocate the "strong first shot" method (a strong application at first, withholding at the end, and controlled application during the middle of the growing season) for early rice in the green manure-rice-rice crop system. For early rice in the triple crop system, we advocate use of "a single massive shot" method. For late rice in a double crop system, we advocate "a stimulating shot at first followed by a moderate amount in the middle of the growing season." For mid-season rice, we advocate a "moderate amount at the outset and a stimulating shot in mid-season." We advocate ammonium carbonate applied deeply.

1. The superior variety question. Hybrid rice is at a low ebb in Hubei Province where only 1.29 million mu of it was grown in 1979. The great fanfare accorded it in the past was wrong, and its present great disrepute is not good either. The problem lies in how best to conscientiously summarize the lessons of experience. Hybrid rice possesses powerful advantages. With mastery of its planting peculiarities, it can increase yields by more than 100 jin per mu in open field plantings as compared with conventional rice varieties. As a late season rice variety, it matures between 10 and 15 days earlier than conventional rice, and is thus an excellent rotational crop for use with rape and other crops in a triple crop system. As a mid-season rice crop, it occupies an even more important position. By using it, development of a two crop system of wheat and rice, or wheat-green manure-rice can be given impetus. This is a major point in Hubei Province's development of hybrid rice. Development of hybrid rice requires perseverance and steadiness in action. Here are three main points that coalesce the experiences of various places in mastering hybrid rice production: (1) Need for a vigorous leadership team; (2) need for a promotional corps versed in skills; (3) need for a centralized seed propagation and production base.

A tendency currently exists in the matching of varieties [in rotational cropping] and that is concern only for high output in the present season to the neglect of increased output in the following season. As was said in the foregoing, during the past several years some places overextended the planting of late ripening varieties with the result that the late crop in a double crop system could not be planted on time, so per unit yields did not go up. In 1977, Jianyang County arranged for medium ripening varieties as 40 to 50 percent of its early rice crop and arranged for early transplanting of the late crop in a double crop system. As a result, the early crop yielded 780 jin per mu, and the late crop yielded 527 jin per mu, for a total for the two crops of 1,307 jin per mu. But this year Jiangling County used late ripening early crop rice variety Guangluai No 4, planting it as 80 percent of the crop. Though the early crop yielded 816 jin per mu, owing to inability to transplant the late crop seedlings at the right time, per mu yields were only 297 jin, and output of the two crops combined was 1,113 jin per mu of the two counties. Jianyang County harvested 200 jin per mu more. The mid-season rice areas also had a problem from the blind expansion of late ripening variety "691," which many used for 80 percent of their crop. Knowing when to sow it was difficult to decide and it was transplanted late. Harvest time was overcast and rainy, opening the paddy rice to mildew and rot loss, and the delay in clearing the fields meant delay in the autumn planting of other crops. Therefore, a scientific attitude is necessary in the matching of varieties with consideration being given to every aspect, and the entire year's crops kept in mind. If the mid-season crop is to be a late ripening variety fo the most part, it should be matched with a medium ripening or early ripening variety. Early (rice) may substitute for mid-season rice, and after the harvest, the field can be readied for use as a rape seedling bed. A short season of green manure may also be grown after which wheat may be sown in the fall (in a triple crop system every 2 years). In recent years some places have blindly substituted xian for geng as the late rice crop in a double crop system, with the result that autumn winds bent the panicles reducing output. Many years experience has shown that in the double cropping of rice, adherence to xian for the early crop and geng for the late crop is the only way to go.

In seed work, one must both give attention both to the "four -izations and one supply," and meet current levels of science and technology. The program of "four by oneself and one with assistance" has to continue to be implemented and a good job done in transition so that superior varieties will truly be able to bring about a renewal within 3 years.

4. Need to persevere in maintaining warmth while raising seedlings. Cold waves with low temperatures are fairly common during early spring in Hubei Province, so maintenance of warmth in raising seedlings plays an extremely important role in protecting the seedlings from rotting, in making sure of being ready at the right time in the season, in assuring the planting of a certain acreage, in assuring quality, and in maintaining superior varieties. During the past 2 years, use of plastic sheeting for the growing of seedlings has declined, and growing of seedlings in hothouses has declined even more. This has been bad for increased yields from double rice crops. Why is it that proven effective methods are not widely applied? There are numerous reasons, but the main one is poor quality plastic sheeting, high cost, good sheeting being useable for 2 years, poor sheeting being useable for only 1 year, and farmer inability to spend so much. Therefore, needed is improvement in the quality of the plastic sheeting, a drop in price, and having industry really support agriculture.

"Three seedlings: (large seedlings and wholesale-grown seedlings, seedlings grown under plastic sheeting, hydroponic seedlings from hothouses, and open air seedlings) have to be matched when planted inasmuch as each of the "three seedlings" has its own conditions and adaptability. From a developmental standpoint, places possessing the conditions should actively experiment and study the "factorization of seedling raising, the standardization of seedlings, and the mechanization of transplanting seedlings," for future conditional promotion and exploration of experiences.

5. Need to diligently handle crop diseases and insect pests. During the past couple of years, the "four insect pests" of rice (rice stem borers, leaf rollers, leaf hoppers, and brown leaf hoppers), and the "four diseases" (bacterial blight, sheath and culm blight, rice blast, and green and yellow stunting disease) have been rampant, and have aroused considerable attention. In carring out comprehensive measures for prevention and control, agricultural prevention and control is fundamental. In addition to serious attention to breeding of resistant varieties and organic prevention and control, most important is still chemical prevention and control. It can rapidly and effectively wipe out insects, and will continue to be a major indispensable means of prevention and control in the future.

9432
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OUTLOOK FOR SUMMER GRAIN, RAPESEED DISCUSSED

Wuhan HUBEI RIBAO in Chinese 22 Mar p 1

/Article: Use Maximum Effort For Initial Success in Winning a Bumper Harvest in Agriculture for the Whole Year; Newspaper Reporters and Correspondents Discuss the Very Good Situation This Year for Summer Grain and Summer Rape"/

/Text/ Reporters and correspondents for this newspaper said the following in a discussion about the summer crop harvest throughout the province this year. Right now the summer grain and summer rape crops are growing very well throughout the province. Cadres and commune members in all production areas are now in process of winning an initial success with a bumper harvest for the year from the summer grain and rape crops. They are intensely engaged in mid and late season care of the fields.

As a result of having been sown on time and having received rather good winter care, since the beginning of spring the more than 27 million mu of summer grain crops throughout the province have grown well.

The total number of seedlings, and the total number of main stems and leaves per mu of wheatfields are greater than during the same period last year. Right after the lunar new year, every jurisdiction fertilized the wheat with jointing fertilizer. In Xiangyang Prefecture in the heart of the wheat-growing region, as of the end of February, jointing fertilizer had been applied to 84 percent of the 4.7 million mu of wheat. According to a check made by the Provincial Bureau of Agriculture during mid-March of 13 different kinds of communes in eight prefectures in the province, jointing fertilizer had been applied to more than 80 percent of the wheatfield area. Through proper fertilizer management, every locale had promoted wheat growth to lay a foundation for a bumper summer grain harvest. This year's summer rapeseed situation has improved. An area of 4.59 million mu has been sown to rape in the province, a 1.22 million mu increase over last year. In Jingzhou Prefecture, this year's acreage is 890,000 mu, more than double last year's 420,000 mu. Rape acreage in the six counties of Guangji, Xinchun, Songzi, Jingmen, Xiaogan, and Huangpi averaged more than 100,000 mu. In most places, the rape growth during overwintering was even; systems of responsibility are rather complete, and intensive springtime care has been given fields. The rape is growing well, not only in plains and hilly regions and in the old growing areas, but also in the new growing areas in mountain regions. Prospects for a bumper output of rapeseeds throughout the province are very good this year.

Use of the summer to boost the autumn in taking the initiative for the entire year. Winning a bumper harvest in summer grain and summer rape this year possesses major significance for fulfillment of the entire year's grain and oil production plans, for full triumph over last year's serious natural disasters, and for the realization of economic readjustment. Therefore, it must be fully taken in hand and placed in an important position.

Problems must be looked at in an overall fashion. In the present good situation for grain and rape, there are also some conspicuous problems. One is insufficiently balanced growth. Because some acreage was not cleared of the previous crop until late last year, the sowing season was lengthened. The area of tardily sown and late growing seedlings is fairly extensive, and their growth currently poor. Some spring wheat varieties were also sown too early and began to joint before the lunar new year, with the result that the main stems and young panicles were freeze damaged in varying degrees. Secondly, clearing of the "three ditches" in wheat and rape fields was not done thoroughly, and a serious problem of water stagnation in them occurred. Third, mental preparation to combat calamities and win a bumper harvest has been inadequate. In some places, when people see that the wheat and rape is growing well, they greatly slacken vigilance. Right now, the wheat has only about two more months of growth, and the time for ripening and harvesting of the rape is only little more than a month away. This is the key period of time in which the number of wheat spikes and the number of grains will be decided. It is the most crucial link in winning a bumper summer harvest. Hubei Province has had instances in the past in which what "looked like 400 to 500 jin turned out to be a 200 to 300 jin harvest," the problem being in insufficient care during the mid and late season. This is a lesson that we must learn. Particularly noteworthy is the forecast of the meteorological authorities, which calls for abnormal rainfall in Hubei Province during April this year. This is extremely inimical to the growth of crops to be harvested during the summer, and it is a reminder that we cannot become negligent for any reason. We positively cannot relax care during the mid and late season, and we cannot ignore our struggle against natural calamities.

The main task for mid and late season care of summer grain and rape is to increase the indeces for a guaranteed harvest area, and to increase yields per unit of area. For a number of years, an area of 1 or 2 million mu of crops that were planted each year produced no harvest. Except for some, which were originally planned as green manure or sustained serious natural disasters, for much of the acreage that produced no harvest the problem was insufficiently vigorous combat against disasters. This year, we must reduce to the maximum extent the area from which no harvest can be guaranteed so as to increase overall output. Expansion of the guaranteed harvest area and increase in yields per unit of area both require diligent clearing of the "three ditches." This can both prevent water stagnation and prevent disease, and can also expand the area of guaranteed harvest. Guangqi, Xiaogan, Tianmen, Mianyang, and Sui counties have now strengthened leadership and have launched a movement to upgrade the "three ditches." Their determined action to triumph over damage caused by stagnation and waterlogging merits spread. Last year experience demonstrated that fertilization of wheat at the time of jointing, a side dressing of fertilizer for the rape, and spraying of the plants of both resulted in fine increases in output. Right now, close attention can be given supplemental fertilization of the three kinds of crop seedlings, and preparations should also be made for the timely spraying of fertilizer on wheat and rape, which will help increase the per thousand weight of

grains, and increase yields. In addition, disease and insect pest forecasting and reporting should be intensified, and pesticide apparatus made ready in order to wipe out wheat scab, powdery mildew of wheat and various diseases and insect pests of rape.

In summary, every jurisdiction has already done a great deal of work in order to win bumper harvests in summer wheat and summer rape this year. We must keep up the good work, steel ourselves to fight disasters, and keep matters firmly in hand right up until the fruits of a bumper harvest are in hand.

9432
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SPRING FARMING, PRODUCTION SITUATION REPORTED TO BE GOOD

Wuhan HUBEI RIBAO in Chinese 24 Mar 81 p 1

/Article: "Strengthen Leadership To Do a Good Job of Spring Farming"/

/Excerpts/ This year's spring farming and production situation is very good. Both mental and work preparations are rather complete for the winning of a bumper harvest in agriculture this year.

We are fully confident about winning a bumper harvest in agriculture this year, but we must also fully realize that difficulties and problems still exist in an overall good situation. Stabilizing and improving systems of responsibility for agricultural production is a major matter about which the commune member masses are extremely concerned; in some places it has not completely stabilized. If the system of responsibility for production cannot be stabilized and gradually improved upon, people cannot have complete peace of mind. In some communes and brigades, production plans and measures to increase output have not been sufficiently implemented. Some places lack production funds and plow oxen, and farm implements are inadequate. This is a conspicuous difficulty. Though arrangements for the livelihood of the masses in disaster areas are rather good, in some places they have not yet been put into effect. Additionally, the finishing up work remains to be done on some farmalnd water conservancy projects in order to make fullest preparations against natural disasters. Therefore, in terms of units at the grassroots level, the amount of work remaining to be done is great, and spring farming and production tasks are extremely formidable.

Now the busiest part of the farming season has arrived, and all echelons of leadership organizations must rapidly concentrate leadership energies on spring farming and production.

9432
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BRIEFS

HUBEI SPRING TEA PROCUREMENT--As of April 30, Hubei had procured 17,228 dan of spring tea, more than 250 percent as much as in the same period of last year. [Wuhan HUBEI RIBAO in Chinese 15 May 81 p 1]

TRANSPLANTING EARLY RICE--In Hubei, early rice seedlings have been transplanted to 8.06 million mu of paddy fields that were left idle or were planted to green manure or barley earlier. Excessive rainfall in March and April caused some delay in transplanting early rice. In other localities where paddy fields were planted to rape, wheat or grass [for seeds] earlier, crash harvesting and transplanting are now underway. [Wuhan HUBEI RIBAO in Chinese 14 May 81 p 1]

CSO: 4007/419

BRIEFS

LIVESTOCK INCREASES--Every type of livestock in Ningxia has already safely gone through this year's "spring season when then is little fodder." The death rate for sheep and goats was less than 2 percent, making it the lowest in many years. The total number of lambs born and still living is more than 600,000, of which the famous Tan lambs account for more than half. During the first quarter, the autonomous region procured more than 53,000 Tan sheepskins and Shamao goatskins. This is more than double that of the corresponding period in 1980. [Text] [Beijing RENMIN RIBAO in Chinese 18 May 81 p 1]

CSO: 4007

BRIEFS

DROUGHT IN FEICHENG COUNTY--During last winter and this spring, Feicheng County of Shandong was hit by the worst drought in 30 years. All of the 43 rivers in the county dried up, and so did most of the 110 reservoirs and ponds. Moreover, the water table throughout the county has sunk to a lower level. As a result, some wheat crops planted on hilly areas with a water shortage died. To achieve a bumper wheat harvest despite this drought, measures such as the sinking of more water wells and the purchase of more submersible pumps have been adopted to improve field management of high yielding wheatfields in the county. [Jinan DAZHONG RIBAO in Chinese 9 May 81 p 1]

DROUGHT HURTING WHEAT CROP--The current severe drought is hurting the late-stage growth of the wheat crop in Shandong. In areas where anti drought facilities are good, such as some of the "bumper-crop fields," the wheat crop is still growing well, and a higher output is still possible. But in many other areas, the hilly areas in particular, where irrigation facilities are poor, many wheatfields have been severely hit by the drought and are facing the prospect of a reduced output or no yield at all. Since the time for harvesting wheat is only a little more than 1 month away and the drought is continuing, every effort must be made to strengthen field management. This year Shandong has planted 40 million mu of wheat, of which 25 million mu are on "bumper-crop fields." By maintaining or increasing their yield, these bumper crop fields can play an important role in making up the losses caused by the drought in other wheatfields. [Summary of DAZHONG RIBAO commentary] [Jinan DAZHONG RIBAO in Chinese 9 May 81 p 1]

CSO: 4007/419

BRIEFS

YUNCHENG PREFECTURE COTTON--As of 20 April, 2 million mu of cotton had basically been planted in Yuncheng Prefecture in Shanxi Province. At present cotton has already sprouted on more than 150,000 mu in the prefecture. [Excerpts] [Taiyuan SHANXI RIBAO in Chinese 26 Apr 81 p 1]

CSO: 4007

BRIEFS

RAPESEED HARVEST--Sichuan's rural collectives planted more than 6 million mu of rape from which a bumper harvest was obtained. The output of rapeseed reached more than 1.4 billion jin, an increase of more than 20 percent over 1980. This exceeded the previous historical high. [Text] [Beijing RENMIN RIBAO in Chinese 19 May 81 p 1]

CSO: 4007

BRIEFS

APRIL WHEAT CONDITIONS--According to concerned comrades in the Agriculture and Forestry Bureau of Tianjin Municipality, the suburbs and counties have planted 2.52 million mu of wheat, of which more than 700,000 mu have differing amounts of dead seedlings. This cannot but affect the summer grain yields. There are three reasons for the dead seedlings. One is the severe drought. Two is the low temperatures and freeze damage. Three is the nonimplementation of policy and poor management. [Excerpts] [Tianjin TIANJIN RIBAO in Chinese 11 Apr 81 p 1]

CSO: 4007

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TITLE: "Research on Economical and Reasonable Application of Ammonium Hydrogen Carbonate--Effect of Deep Application in Arid Land For Millet Before Planting"

SOURCE: Taiyuan SHANXI NONGYE KEXUE [SHANXI AGRICULTURAL SCIENCES] in Chinese No 3, Mar 81 pp 2-4

ABSTRACT: Many factors may cause nitrogen fertilizer to be not efficient, including gaseous volatilization, utilization by microbes, lattice fixation of clay minerals, soil moisture condition, etc. Ammonium hydrogen carbonate is also a nitrogen fertilizer that is easily decomposed and becoming volatile. Although it has, in recent years, become popularly available, techniques of applying it properly to obtain its yield-increasing effect remain a problem awaiting an urgent solution. At present, the technique of deep application is extensively recommended, but in arid North, it is very labor consuming and the efficiency remains uncertain. Taking into consideration the loess soil of Shanxi and the special weather condition, an ex-

[continuation of SHANXI NONGYE KEXUE No 3, 1981 pp 2-4]

periment was conducted in 4 forms: (1) Applications of 50, 100, 150 jin/mu, in 3 plots, one month before planting, during spring plowing; (2) 50, 100, 150 jin/mu in 3 plots, 8 days before planting; (3) Following the local method, 50 jin/mu 8 days before planting, again 50 jin/mu during noding stage; (4) No ammonium hydrogen carbonate applied. Applications are all in a depth below 10cm from the soil surface; field management for all plots of all 4 forms are identical. Results indicate that the yield is the highest when the fertilizer is applied one month before planting. Nitrogen content of the stubble, the grain, and the soil of different layers of the various plots is reported.

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TITLE: "Heterosis Utilization in Cotton"

SOURCE: Taiyuan SHANXI NONGYE KEXUE [SHANXI AGRICULTURAL SCIENCES] in Chinese No 3, Mar 81 p 20

ABSTRACT: In 1978, Hejin County began to experiment with heterosis utilization of hybrid cotton. The yield increase effect has been 13.7-83.3 percent. The major problem remains the difficulty of preparing seeds. The method currently being used is forced pollination before blooming, although the technique has been somewhat improved to reduce the quantity of pollens required. The hybridization seed preparation procedure and the yield increase results are briefly reported.

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TITLE: "On Reasonable Fertilizer Application of Rice Paddies"

SOURCE: Fuzhou FUJIAN NONGYE KEJI [FUJIAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 2, 10 Apr 81 pp 11-12

ABSTRACT: When chemical fertilizer is applied to soil, about 30-50 percent of it is truly absorbed by the crops for nitrogen, 10-25 percent for phosphorus, and 10-35 percent for potassium. In Fujian Province, most nitrogen fertilizer used is ammonium hydrogen carbonate and aqua ammonia, the utilization rate is, therefore, even lower. For improving the utilization rate, 3 techniques are discussed: (1) On the basis of applying night soil in the rice paddy as usual, phosphorus and potassium are applied, and phosphorus is especially useful. (2) All types of fertilizer should be applied before the soil is plowed and turned in order to reach the deep layer. (3) All chemical nitrogen, phosphorus, and potassium fertilizers should be machine processed into nodules before applying in order to improve their utilization rate.

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TITLE: "Current Condition of Production and Utilization of Sweet Potato and Suggestions Concerning Its Research"

SOURCE: Fuzhou FUJIAN NONGYE KEJI [FUJIAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 2, 10 Apr 81 pp 21-23

ABSTRACT: According to a UN report of 1973, the sweet potato acreage of the world is about 2.2 hundred million mu, 87.3 percent in Asia, 9.5 percent in Africa, and 3 percent in America, and the unit yield is about 2,500-2,700 jin/mu. China's sweet potato acreage is the largest in the world, amounting to about 45 percent of total. The unit yield is the highest in Zhejiang Province, averaging about 3,700 jin/mu for the 2 million mu of the province. In Fujian, although about 4 million mu of it is regularly cropped every year the yield varies a great deal. In research, problems of high yield and production cost, comprehensive utilization, maturation period, starch, protein, and vitamin contents, and hybridization are the major targets. This paper is a general survey of sweet potato culture of the world, with emphasis on the conditions of sweet potato cropping and research in Fujian Province.

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TITLE: "Technique of Forecasting Several Pests of Rice and Wheat"

SOURCE: Fuzhou FUJIAN NONGYE KEJI [FUJIAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 2, 10 Apr 81 pp 33-36, 39

ABSTRACT: Rice brown leafhopper, army worm, and white withering leaves, and wheat scab are common in Fujian Province. Since 1975, surveys, researches, and analyses have been carried out to find the factors influencing their occurrence and the degree of their damage for the purpose of establishing some indices for forecasting. This paper reports the results of these studies in separate sections: (1) Forecasting the occurrence of brown leafhopper feeding on rice; (2) Forecasting the occurrence of rice army worm; (3) Forecasting the occurrence of rice white leaf withering disease; (4) Forecasting the occurrence of wheat scab disease. The forecasting techniques discussed in each section involve very detailed and different items of observation and mathematical equations to compute the severity of the situation.

AUTHOR: ZHANG Xuebo [1728 1331 0590]
YU Jusheng [0157 5418 3932]

ORG: Both of Fujian College of Agriculture

TITLE: "Research on the Physiological Strain of Pathogens of Blast of Rice in Fujian"

SOURCE: Fuzhou FUJIAN NONGYE KEJI [FUJIAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 2, 10 Apr 81 pp 37-40

ABSTRACT: Production practice has proved that selective breeding and extension of disease resistant breeds are the most economical and effective measures for preventing and controlling blast of rice. Researches on identification of strains of pathogens, their geographical distribution, variation, increase and extinction are, therefore, important for selection, introduction, and arrangement of disease resistant breeds of rice, as well as for forecasting and prevention of loss of disease resistance. The authors began in 1973 to identify the blast pathogens in Fujian Province, and the results were summarized in 1976. This paper reports the results of studies carried out in 1978 - 1980. The term, physiological strain used here, implies that pathogenic fungi of the same species may be identical in morphology but different in their disease causing ability for host-plants of different breeds.

AUTHOR: CHEN Kangchuan [7115 0073 1557]

ORG: Fujian Provincial Public Health and Epidemic Prevention Station

TITLE: "A Survey of Swine Leptospirosis"

SOURCE: Fuzhou FUJIAN NONGYE KEJI [FUJIAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 2, 10 Apr 81 pp 41-43

ABSTRACT: Leptospirosis is a common disease of domestic animals in Fujian Province and occurs most frequently to pigs. The bacteria often infect the kidney of the swine, especially young piglets, and are discharged through the urine constantly to pollute the water and the natural environment and to cause epidemics among human inhabitants. Pathological or serological studies in 1972-1978 revealed the fact that infected pigs existed in 75 percent of the counties of the province. The carrier rate of pigs that are allowed to run loose was found to be 3 times that of pigs that are confined in sties. This paper is a summary report of surveys and experiments conducted on pigs in several parts of the province to assess the nature and the extent of leptospiral infection among the herds.

AUTHOR: XIA Liqun [1115 4539 5028]

ORG: Yunnan Provincial Plant Protection and Plant Inspection Station

TITLE: "Relationship Between the Pathogenic Characteristic of the Strain of Rice Blast Pathogen and the Disease Sensitivity of the Rice Breed"

SOURCE: Kunming YUNNAN NONGYE KEJI [YUNNAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 2, 25 Mar 81 pp 11-14, 17

ABSTRACT: At present, different viewpoints exist in the work of research and prevention and control of blast of rice concerning problems of deterioration of disease resistance of rice breeds, identification of strains of pathogens, and changes of these strains. In 1978, the author participated in the work of Yunnan Provincial Rice Blast Pathogen Strains Research Cooperative Group, under the auspices of the Yunnan Provincial Academy of Agricultural Sciences. In view of the results of the experimental work of that year, the author believes that the relationship between the pathogen and the sensitivity of the breed is not a one to one relationship. In reality, many strains that are identified as belonging to one breed of pathogens have different pathogenic characteristics. It appears that a number of strains of different pathogenic characteristics exist in a single locality or on a single breed of rice to form a pathogenic system, while the pathogenic spectrum varies a great deal from one system to another, as well as within a single system.

AUTHOR: YAN Weizhong [0917 0143 0022]
SUN Maolin [1327 5399 2651]

ORG: None

TITLE: "Seedling Stage Diagnosis of White Leaf Withering Disease of Rice"

SOURCE: Kunming YUNNAN NONGYE KEJI [YUNNAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 2, 25 Mar 81 pp 15-17

ABSTRACT: It has been understood that the pathogens of rice white leaf withering disease are carried by the seedlings and if drugs are applied to the seedling bed, the occurrence of the disease in the paddy may be either delayed or lessened. Rice seedlings seldom show any symptom of the disease, however, and few can be convinced that drugs should be applied to the seedling bed. In 1978-80, a method of cutting up leaf sheath to be soaked, cultured, and concentrated and used for inoculation was devised to determine whether the seedlings were infected or not. With this technique, the white leaf withering disease can be diagnosed during the seedling stage when there are no visible symptoms. Details of the technique are reported.

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AUTHOR: WU Taiwen [0702 1132 2429]

ORG: Caoshi Commune Agricultural Technology Station, Honghu County

TITLE: "Preliminary Understanding of the Technique of Determining Cultivation Procedure According to the Leaf-age of the Rice"

SOURCE: Huangguang HUBEI NONGYE KEXUE [HUBEI AGRICULTURAL SCIENCES] in Chinese No 4, Apr 81 pp 6-7

ABSTRACT: On the basis that (1) In the life of a rice plant, the number of leaves appears in relatively stable stages and the leaf-age may correctly be used as the indication of the growth and development stage of the rice plant; (2) There is a synchronous relationship in the development of the roots, the stem, the leaves, and the spikes; the observation of one reveals the others; (3) The shape of growth of leaves can indicate the condition of transfer of materials and energy within the plant body for determing the effect of the external condition on the development of the rice plant, a technique of rice high yield culture has been devised to use the number of leaves on the rice plant [the leaf-age] as a time table to supply or adjust water, fertilizer, air, or heat so as to achieve the desired proper management of the rice crop. Details of this technique are reported.

AUTHOR: LIU Zhonggui [0491 0112 2710]

ORG: Research Student Class 78, Wuhan College of Hydroelectrical Power

TITLE: "Effect of Low Temperature Water of the Reservoir on the Growth of Early Rice"

SOURCE: Huangguang HUBEI NONGYE KEXUE [HUBEI AGRICULTURAL SCIENCES] in Chinese No 4, Apr 81 pp 8-11

ABSTRACT: Since the establishment of the nation, many reservoirs of all sizes have been constructed in Hubei Province and they have had a great function in resisting drought and flood with the result of greater agricultural production. The yield of rice in many reservoir irrigated areas has exceeded 1,000 jin/mu. Within a single irrigation district, the yield varies a great deal, however. When the cultivation techniques are examined, it is disclosed that the effect of the temperature of the irrigation water is one of the major factors influencing the uneven yield. With many reservoirs, due to the limitation of the water drawing structure, irrigation water is taken from the bottom of the reservoir, while during the early stage of growth of the early rice crop, the air temperature is low, and the growth of the plants are adversely affected by the low temperature of the irrigation water as well. The effect is most seriously observed in the vicinity of the upper reaches of main irrigation channel In 1980, a study was carried out to examine this effect. Among other findings, it was revealed that the temperature of the water of the bottom of the reservoir is much lower than that of the water of the surface layer.

AUTHOR: LI Qidong [7812 0796 2639]

ORG: Xiangyang County Bureau of Agriculture

TITLE: "For Intermediate Rice, Dense Planting of Strong Seedlings in Small Bundles Should be Practiced"

SOURCE: Huangguang HUBEI NONGYE KEXUE [HUBEI AGRICULTURAL SCIENCES] in Chinese No 4, Apr 81 pp 11-13

ABSTRACT: At present, intermediate rice is generally cultivated in "large bundle, dense planting" i.e. in a distance between bundles of 3-4 x 6 cun, 8-12 seedlings are planted, to amount to 200-400 thousand seedlings/mu. For every mu of paddy, as much as 30 jin of rice seeds are used in this manner. In recent years, a new technique of small bundles dense planting has been experimented and demonstrated in many places in Xiangyang County. On the basis of sparse seeding to grow strong seedlings, the bundle is reduced to 3 x 6 cun and in it 1-3 seedlings are transplanted. With this new technique, 5 jin of seeds/mu of paddy are sufficient. Compared with the old technique, 25-30 jin of seeds are saved while the yield is 906.8 jin/mu, more than 100 jin higher than the old technique. The procedure of the new technique, the theory, and the results are reported.

AUTHOR: WANG Ying [3769 4964]

ORG: Jinzhou Branch, Central China College of Agriculture

TITLE: "Readjust Cotton Field Arrangement to Enlarge the Cotton Acreage"

SOURCE: Huangguang HUBEI NONGYE KEXUE [HUBEI AGRICULTURAL SCIENCES] in Chinese No 4, Apr 81 pp 14-17

ABSTRACT: Hubei is one of China's 5 major cotton production regions, with about 9 million mu of cotton a year, amounting to 1/8 to 1/9 of the cotton acreage of the country and 1/5 to 1/6 of the cotton production. The natural condition of the province is favorable for cotton. Following a discussion of 5 areas of the province, which the author believes to be unsuitable for growing cotton, the paper describes 3 areas of the province, where cotton culture is very suitable and where there are either no or only small areas of cotton growing at present. This paper divides the province geographically into regions to examine the soil, temperature, rainfall, daylight hours, etc. as well as the area of arable land to arrive at a scheme of adjusting the cropping and crop rotation systems of these regions so as to make more acreage available that is more suitable for cotton culture than the cropping systems practiced in these regions at present.

AUTHOR: CHANG Rusheng [1603 3067 6966]
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ORG: CHANG of Crop Species Resources Center, Chinese Academy of Agricultural Sciences; DENG of Vegetable Oils Center, Chinese Academy of Agricultural Sciences; TONG of Cereal Crops Center, Hubei Provincial Academy of Agricultural Sciences

TITLE: "Preliminary Report of Investigation of Wild Soybean Resources in the Mountains of Western Hubei"

SOURCE: Huangguang HUBEI NONGYE KEXUE [HUBEI AGRICULTURAL SCIENCES] in Chinese No 4, Apr 81 pp 17-19

ABSTRACT: The authors investigated the wild soybean resources in the mountains of western Hubei in 1980 for the purpose of understanding the distribution of wild soybean, gathering resources of soybean species, and developing studies on the origin of soybean cultivars and many other related subjects. The results of the survey work is reported under the headings of (1) Distribution of wild soybeans and their environment; (2) Their characteristics and properties; (3) Effects of elevation on the characteristics of the plants and their distribution; (4) The sizes of the colonies of wild soybeans; (5) Wild soybeans are found to be seldom affected by diseases and pests, very adjustable, tall, and having a much higher protein content than domestic breeds. Other areas of the provinces, including the counties of the river plains and their surrounding hills, etc. have not yet been investigated. The authors believe a continuation of the survey work to be very worthwhile.

AUTHOR: None

ORG: Yichang District School of Agriculture

TITLE: "Experiment With Different Quantities of Green Manure for Early Rice"

SOURCE: Huangguang HUBEI NONGYE KEXUE [HUBEI AGRICULTURAL SCIENCES] in Chinese No 4, Apr 81 pp 23-26

ABSTRACT: Chinese milk vetch [Astragalus sinicus] is used in Hubei as the basic fertilizer for early rice. In the past few years, the yield of vetch has been dropping year after year in many areas to result in a yield reduction of early rice, while in some paddies, the yield of vetch has increased but not that of the early rice. In 1980, an experiment was arranged applying 2,000, 4,000, 6,000 jin of vetch in 3 plots of 0.01 mu each and repeating 3 times for the purpose of determining the optimal quantity of vetch for the early rice. Results indicate that as the basic fertilizer, the quantity of vetch used should not be too great. The application of tillering fertilizer should be substantially reduced while heading fertilizer should be emphasized. The result of the experiment also raises the question of the effect of sunning the paddy at the end of the tillering stage. This traditional method of controlling ineffectual tillering appears to be neither necessary nor beneficial.

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TITLE: "Research on the Root Developing Ability of Rice Seedlings: I. Root Development of Seedlings and Movement of Materials"

SOURCE: Shanghai SHANGHAI NONGYE KEJI [SHANGHAI AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 2, 5 Apr 81 pp 1-3, 25

ABSTRACT: It is generally believed that the ability to develop roots is the major index for judging the seedling to be strong or weak, but there are very few reports on the root development ability of rice breeds of different ecological types, the effects of environmental conditions, especially the light condition, on the root development of seedlings, the relationship between accumulation, consumption, and transfer of photosynthesis products and the development of the root system, etc. This paper reports an experiment with 8 breeds of early and late rice for the purpose of seeking answers to the above questions. The authors conclude that the root developing ability of rice seedlings is related to the ecological type of the breed; it is greater for breeds of taller stalk and large spikes. The root development ability is higher for hybrid rice; perhaps this is due to the higher material transfer efficiency and photosynthesis effect of the hybrids. When the light exposure is reduced, the number of roots is obviously reduced, but the weakened light condition has less effect on the growth of roots and appears to suppress the growth of the above ground portion of the plant first.

AUTHOR: None

ORG: Cereal Cultivation Office; Office of Agricultural Physics, Center of Crops, Shanghai Municipal Academy of Agricultural Sciences

TITLE: "Summarization of Test Cultivation of 77-6 A New Early Rice Breed "

SOURCE: Shangahi SHANGHAI NONGYE KEJI [SHANGHAI AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 2, 5 Apr 81 pp 4-5

ABSTRACT: The 77-6 is an early Xian rice of intermediate maturation, bred out by the Research Office of Agricultural Physics in 1976 by laser treatment of a hybrid offspring before breeding and selection. An area of 62.3 mu was assigned to test it. In the 2 years, the average yield was 845 jin/mu, with a highest yield of 1,039 jin/mu, 2.6-7.1 percent higher than the control. In the suburbs, many test areas were established to total 900 mu. The yield was generally 700-900 jin/mu, 5-12 percent higher than the control. Based upon the test results, the growth and development characteristics and the essential cultivation techniques of this new breed are discussed.

AUTHOR: GAO Shixiu [7559 1102 4423]

ORG: Shanghai Municipal Meteorological Center

TITLE: "Agricultural Meteorological Forecasting for the Yield of 3 Wheat Crops"

SOURCE: Shanghai SHANGHAI NONGYE KEJI [SHANGHAI AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 2, 5 Apr 81 pp 8-9

ABSTRACT: In the region of Shanghai, yields of the 3 wheat [wheat, naked barley, and oats ?] are high but not stable. There are many reasons for this condition. The author, using data of a quantitative relationship between the meteorological condition and the yield, offers in the paper a model for forecasting the yield. An analysis using the model revealed that weather is the most important factor influencing the yield. If the rainfall of the growth and development period exceeds 500mm with more than 75 rainy days, it will be a low yield year. Effects of the 5 unfavorable weather conditions of frequent rain during planting time, low temperature during germination time, frequent rain during noding and spike evolvement time, insufficient light and rain during blooming and starch filling time, and high temerature during the ripening time are assigned 20, 10, 10, 50, 10 percent etc. to arrive at a generally accurate formula for using the weather conditions to forecast the yield.

AUTHOR: None

ORG: Trace Element Group, Center of Soil and Fertilizer, Shanghai Academy of Agricultural Sciences

TITLE: "Content and Distribution of Cobalt in Soils of Shanghai Suburbs"

SOURCE: Shanghai SHANGHAI NONGYE KEJI [SHANGHAI AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 2, 5 Apr 81 pp 11-12, 42

ABSTRACT: A deficiency of cobalt in the soil will cause the nitrogen fixing ability of root tuber of beans to be weak and the vegetative feed to be deficient of cobalt, and this will in turn cause the cud of cows and sheep to have less Vitamin B_{12}. The cows and sheep will become anemic, thin, easily sick, etc. A study was conducted to reveal that compared with the average of the soils of the world, the soils of Shanghai contain relatively high whole cobalt. The contents of effective cobalt [Co^{++} or $Co(OH)_2$] are not high, however. Based upon the data of the study, the relationship between the effective cobalt content and the pH, organic matter, clay granules, active manganese, effective iron, effective zinc, whole nitrogen, whole phosphorus, and whole potassium of the different soils is discussed. It appears that a proportional relationship between content of effective cobalt and that of whole potassium is the most obvious.

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TITLE: "Variations in the Characters of Upland Cotton (Gossypium hirsutum) Induced by Exotic DNA of Sea-Island Cotton (Gossypium barbadense)"

SOURCE: Beijing YICHUAN XUEBAO [ACTA GENETICA SINICA] in Chinese No 1, Mar 81 pp 56-62

TEXT OF ENGLISH ABSTRACT: DNA was extracted and purified from the seeds of sea-island cotton "416" (G. barbadense). After having been recombined with calf histone and added a hydrolysate of protein and nucleic acid as well as Ca^{++} and Zn^{++} ions, it was injected into fertilized young bolls of upland cotton "glandless" (G. hirsutum) one or two days after flowering. Variations in the characteristics (morphological characteristics, growing period, vegetative organs, reproductive organs and other characteristics of economic importance) were observed already in offspring from one to three generations.

AUTHOR: ZHU Zhongchun [4376 0112 4783]
WU Haishan [0702 3189 3790]

ORG: Both of the Institute of Genetics, Chinese Academy of Sciences, Beijing

TITLE: "Induction of Haploid Plantlets from Unpollinated Ovaries of Nicotiana tabacum Cultured In Vitro"

SOURCE: Beijing YICHUAN XUEBAO [ACTA GENETICA SINICA] in Chinese No 1, Mar 81 pp 63-65

TEXT OF ENGLISH ABSTRACT: The results obtained on induction of haploid plantlets from unpollinated ovaries of Nicotiana tabacum were reported briefly in 1979. Some new results are presented here in detail.

In vitro culture of ovaries and ovules has been carried out by many authors, some of whom obtained plantlets. But so far the production of haploid plants derived from unpollinated ovaries of Nicotiana tabacum has never been reported. We obtained haploid plantlets which grew from the ovules in the unpollinated ovaries of tobacco cultured in vitro. Plantlets derived directly from the ovules and the chromosome number of their root tips were haploid. These haploid plants flowered, but had no seeds. The plants were shorter, weaker and had smaller flowers than did the diploid ones. The style of the haploid plants was longer than the filament and this was also quite different from that of the diploid plants. Our investigations provide a new way of obtaining haploid plants for genetic and breeding

[Continuation of YICHUAN XUEBAO No 1, Mar 81 pp 63-65]

studies and this may lead to the parthenogenesis of higher plants under the controlled conditions beyond seasonal and natural limitations. Study of this kind may also provide some material for investigation of the mechanisms in apomixis. The production of haploid plants from unpollinated ovaries culture, therefore, is not only of practical value in plant breeding, but also is of theoretical significance in genetics, embryology, cytology and other disciplines.

Haploid plants were obtained again from cultured unpollinated ovaries of haploid plants which were derived from ovary culture <u>in vitro</u>.

AUTHOR: GAO Mingwei [7559 2494 1414]

ORG.: Agronomy Department, Zhejiang Agricultural University, Hangzhou

TITLE: "A Preliminary Analysis of the Genotypes of Hybrid Shen Rice with Wild Rice Cytoplasm"

SOURCE: Beijing YICHUAN XUEBAO [ACTA GENETICA SINICA] in Chinese No 1, Mar 81 pp 66-74

TEXT OF ENGLISH ABSTRACT: A genetic analysis of the frequency distribution of the seed setting rate of the plants in F_1, F_2 and BC_1 populations shows that the male sterility of the Shen rice sterile line with wild rice cytoplasm is controlled by two pairs of independent recessive genes ($r_1r_1r_2r_2$). The fertility restorer IR-24 has two pairs of dominant genes ($R_1R_1R_2R_2$). The hybrid rice with genetic constitution of [S]$R_1r_1R_2r_2$ gives an average seed setting rate of 57 percent with a distribution ranging from 30 percent to 75 percent when the panicles are bagged during heading time. Another 25 percent seed fertility could be added to the average when panicles are exposed to open pollination.

The type of additive effect of the dominant genes on fertility restoration has also been revealed in the analysis of the experimental data.

AUTHOR: YANG Zhonghan [2799 0022 3352]
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ORG: Both of the Biology Department, Beijing University

TITLE: "Physicochemical Properties of Pollen-wall Protein of Cucurbita pepo and Luffa cylindrica and Their Possible Role in 'Recognition' Reaction"

SOURCE: Beijing YICHUAN XUEBAO [ACTA GENETICA SINICA] in Chinese No 1, Mar 81 pp 75-83

TEXT OF ENGLISH ABSTRACT: Fresh pollen of Cucurbita pepo and Luffa cylindrica was extracted for 1-50 minutes in a cold isotonic Tris-HCl buffer containing 10 percent sucrose, 100 ppm Ca^{++} and 100 ppm boron. This treatment preserved pollen viability and kept the pollen grains from bursting, thus preventing the leakage of the nonpollen-wall proteins. After partial purification by 90 percent $(NH_4)_2SO_4$ precipitation (or by gel filtration), the pollen-wall diffusates were subjected to spectrophotometric analysis at 280 nm and 260 nm. Optical readings showed that in C. pepo, protein released in 1 minute had reached nearly one-half of the total protein content. Maximum absorption occurred in 20 minutes, followed by a leveling off. Polyacrylamide gel electrophoresis showed that the pollen-wall diffusates of both plant species contained seven main protein zones. Three bands gave positive PAS reaction, indicating that they were glycoproteins. Paper chromatographic analysis showed that the carbohydrate fraction of the glycoprotein of both plant

[Continuation of YICHUAN XUEBAO No 1, Mar 81 pp 75-83]

species consisted of galactose, arabinose and some other sugar which has not yet been identified.

Pollen-wall protein of both plant species showed isozyme bands of esterase and acid phosphotase, but no alkaline phosphotase.

After dissociation in SDS and mercapto-ethanol and electrophoresis in SDS gels, many bands appeared in pollen-wall diffusates of both plant species. By comparing their mobilities with those of standard proteins of known molecular weights, the molecular weights of some of the major fractions of pollen-wall diffusates of Luffa cylindrica were estimated to be 12,000, 25,000, 43,000, 46,000 and 76,000.

Intergenetic crossing of Luffa cylindrica (♀) x Cucurbita moschata (♂) is highly incompatible, but application of pollen-wall diffusate of Luffa cylindrica (containing 2-5 mg/ml protein) to the stigma prior to pollination with pollen of Cucurbita moschata resulted in 5 percent fruit setting. The resultant fruits contained viable seeds.

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ORG: All of the Department of Agrobiophysics, Beijing Agricultural University

TITLE: "The Genetic Types of Induced Mutations in Barley (Hordeum vulgare)"

SOURCE: Beijing YICHUAN XUEBAO [ACTA GENETICA SINICA] in Chinese No 1, Mar 81 pp 84-90

TEXT OF ENGLISH ABSTRACT: Using barley as material, we have studied the genetic types of mutations occurring in the progenies of seeds treated with mutagenic agents.

With the different numbers, places and directions of mutations as criteria, the mutation occurring in the spike initial cells could be divided into different types. According to the numbers of mutations occurring, they could be differentiated into mono- and poly-locus mutations. Both could further be subdivided into those occurring on the M_1 spike level and those occurring on the M_1 plant level. In addition, the latter could be subdivided into: (1) mosaic mutations, (2) multiple mutations and (3) isolocus mutations. Each of these types could be subdivided so that a total of 12 possible genetic types of mutations could be listed altogether.

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Several of the above-mentioned types were illustrated by examples. It is hoped that this study will be helpful in a better understanding of the heredity of induced mutations, and also afford a scientific basis for the screening and utilization of induced mutants.

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ORG: ZENG and YANG both of the Institute of Genetics, Chinese Academy of Sciences, Beijing; WANG of the Kunming Institute of Agricultural Science, Yunnan

TITLE: "The Relative Analyses on Maize Cultivar Menghai Four-row Wax"

SOURCE: Beijing YICHUAN XUEBAO [ACTA GENETICA SINICA] in Chinese No 1, Mar 81 pp 91-96

TEXT OF ENGLISH ABSTRACT: The studies on morphology and isoenzyme spectrum of the maize cultivar Menghai Four-row Wax were carried out. The results of the experiment were as follows:

1. Maize cultivar Menghai Four-row Wax originated in Menghai County, Yunnan Province. It was a primitive cultivar with many characteristics of wild maize. For example, each ear had four rows or six rows and eight rows, it was smaller, and the smaller grains were covered partly by the bracts of the spikelet, and rachises of the tassel were on the tops of the ears.

2. The analyses of the peroxidase isoenzyme showed some differences in the zymogramic patterns. The Menghai Four-row Wax had the fifth band as other waxy maizes and Coix, which originated in China, but the fourth band was absent. The American dent maize had the fourth band, but did not possess the fifth band.

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3. According to these observations, it was reasonable to believe that waxy maize actually originated in Yunnan Province of China, being one of the primary original centers of maize.

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